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The Graduate School

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THE GRADUATE SCHOOL

ADMINISTRATION

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BESSIE ELLEN OUTTERSON, B.S., *Secretary.*

SECRETARY OF THE FACULTY

Professor BENTON SULLIVAN MONROE, Ph.D.

GENERAL COMMITTEE OF THE GRADUATE SCHOOL

1926–27

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Professor T. L. LYON, *Group G.*
THE DEAN, *Chairman ex officio.*

CALENDAR OF THE GRADUATE SCHOOL FOR 1926–27

1926	**FIRST TERM**
Sept. 22, Sept. 23	Registration of new students.
Sept. 24	Registration of old students.
Sept. 27	Instruction begins.
Dec. 15	Last day for announcing titles of theses by candidates for advanced degrees in June.
1927	
Feb. 2	Last day for completing requirements for advanced degrees to be conferred in February.
	SECOND TERM
Feb. 4, Feb. 5	Registration for the second term.
Feb. 7	Instruction begins.
March 15	Last day for filing applications for fellowships and graduate scholarships.
June 8	Last day for completing requirements for advanced degrees to be conferred at Commencement.
June 13	Commencement.

THE GRADUATE SCHOOL

HISTORY AND ORGANIZATION

THE initiation of graduate studies at Cornell University was coincident with the establishment of the University; the first advanced degree was conferred at the second annual Commencement. Until 1896 there was no formal organization of graduate studies, which were intrusted to the direction of the University Faculty, although beginning with 1890 a standing Committee on Graduate Work of the University Faculty had general charge of graduate study. In 1896 graduate work was definitely organized as a Graduate Department under the immediate charge of the University Faculty. In 1909, on the recommendation of the Faculty, the Board of Trustees established the Graduate School, to have exclusive jurisdiction over all graduate work and advanced degrees.

The President of the University is ex officio Chairman of the Faculty of the Graduate School, which consists of all members of the University staff who are actively engaged in supervising the work of graduate students. The Dean of the Graduate School is the executive officer of the Faculty.

For the convenient discussion of questions which chiefly concern those engaged in related fields of work, the members of the Faculty of the Graduate School are divided into seven groups, as follows:

A. Languages and Literatures.
B. History, Political Science, Philosophy, Education.
C. Mathematics, Astronomy, Physics, Chemistry, Geology, Physical Geography.
D. Biological Sciences.
E. Engineering, Architecture, Applied Physical Sciences.
F. Science Departments of the Cornell University Medical College in New York City.
G. Agricultural Sciences.

The General Committee of the Graduate School consists of four members at large, elected by the Faculty; seven members elected, one by each group; and the Dean, who is ex officio chairman of the General Committee.

THE PURPOSE OF GRADUATE STUDIES

The purpose of the Graduate School is two-fold: it aims to provide the student with a comprehensive view of a field of knowledge and to train him for individual investigation in that field. The student who comes as a candidate for the master's degree will normally devote the larger part of his time to the first of these aspects; he will need to supplement and to correlate his understanding of his field, to study its background and its relationship to kindred fields, to gain a wider vision of its significance. The student who comes as a candi-

date for the doctor's degree will first secure this broader understanding and then push on to cast new light on some phase of it, to enlarge in some measure the knowledge of the field. But to all who come the Graduate School strives to furnish the technique of analyzing a body of information or observation and the power to express an independent and unprejudiced judgment.

In furnishing this opportunity for independent study and investigation, the Graduate School seeks to make the conditions such as will enable the student to devote himself wholly to his chosen field. Unhampered by restrictions that necessarily obtain in undergraduate work, he will come into freedom of association with older scholars, who will seek to make his work profitable to him by giving him such aid and directions as he may need. Inasmuch as subjects differ greatly, the requirements for all subjects cannot be stated in terms at once specific and uniform. In some departments of knowledge original research may begin with the student's entrance into the School; in other subjects much preliminary work may be necessary to fit the student for profitable research.

In carrying on studies in the Graduate School, the student is expected to assume the initiative and the responsibility. All courses of study offered in the University, and all the facilities for study and investigation afforded by its libraries, museums, and laboratories are open to graduate students in so far as they are qualified to make use of such facilities. It is important, however, to recognize from the beginning that graduate work does not consist in the fulfilment of routine requirements, and that the various opportunities for study, as well as the advice and assistance of teachers, are to be regarded simply as aids to the student in acquiring for himself the discipline and method of independent scholarship.

ADMISSION

Graduates of the following colleges of Cornell University, namely, the College of Arts and Sciences, the College of Architecture, the College of Engineering, the Medical College, the New York State College of Agriculture, the New York State Veterinary College, and the New York State College of Home Economics, and also graduates of other institutions in which the requirements for the first degree are substantially equivalent, are eligible for admission to the Graduate School. In other cases studies pursued after graduation, and experience gained by professional work or otherwise, are taken into consideration in deciding whether the candidate's preparation as a whole is such as to justify his admission to the Graduate School.

In order to be admitted to the Graduate School, a student must furnish evidence that he has already received a first degree, by presenting either a diploma or a statement from some official source. The simplest procedure will ordinarily be to submit an official statement from the registrar or dean that the degree has been conferred. In the case of graduates of Cornell University this is not necessary,

since the records are conveniently accessible. Graduates of colleges which are not on the Approved List of the Association of American Universities should in every case submit with their applications for admission a transcript of their undergraduate studies.

To avoid delays at the beginning of the academic year, those who desire to enter the Graduate School are advised to make application for admission, either in person or by letter, in the preceding spring or summer. Correspondence should be addressed to the Dean of the Graduate School, Cornell University, Ithaca, New York.

Seniors in the colleges of Cornell University who have completed all requirements for the Bachelor's degree except that of residence, may, with the approval of the deans of their respective colleges, be admitted to the Graduate School.

Ordinarily, a student admitted to the Graduate School is eligible for admission to candidacy for an advanced degree in any field for which he has had the necessary preparation. In every case he must receive the recommendation of his Special Committee that he is qualified to undertake such advanced work as the Faculty will accept for the degree. Candidates for one of the advanced technical degrees, M.C.E., M.M.E., M.E.E., M.Arch., M.F., M.Chem., M.L.A., and M.S. in Agr.,must have had the equivalent of the corresponding first degree at Cornell University. No student, however, may be admitted to candidacy for an advanced degree whose training has not included work in a foreign language.

Graduates of colleges other than those of Cornell University whose training is regarded as less than one year short of that required for the first degree at Cornell, may be admitted to the Graduate School, but not to candidacy for an advanced degree. Graduates of colleges other than those of Cornell University whose training is regarded as a year or more short of that required for the first degree at Cornell, are required to enter an undergraduate college.

REGISTRATION

Students who have been admitted to the Graduate School are required to register both in the office of the Graduate School and in the office of the Registrar of the University on the regular registration days of each term, unless special permission for later registration has been granted by the Dean.

A CERTIFICATE OF VACCINATION REQUIRED BEFORE MATRICULATION

Every student matriculating in the University is required to present to the Registrar a satisfactory certificate of vaccination. This certificate is considered satisfactory only if it certifies to a successful vaccination within the last five years or certifies that at least three unsuccessful attempts at vaccination have been made within that same period. The certificate must be filed with the Registrar on or before August 1.

THE CHOICE OF A FIELD OF STUDY

Each student, upon entering the Graduate School, must choose a field of study. Within that field, the branch of knowledge to which he intends to devote the larger part of his time is termed his Major Subject; the other subject or subjects, which will necessarily be more restricted in their scope and which should be selected with reference to their direct bearing upon the Major Subject, are termed the Minor Subjects.

The Graduate School does not prescribe the fields in which a student may pursue his work; any group of subjects, recognized as of graduate standing, which has a basic unity is considered a proper field for study. As a general principle, however, when the Major Subject is selected from the applied sciences, it is desirable that the theoretical science or sciences most directly involved should be chosen as Minor Subjects.

The work of each graduate student who is a candidate for an advanced degree is in charge of a Special Committee consisting of the teachers under whom his major and minor studies are pursued, a representative of his Major Subject being chairman. The student is expected to confer freely with the members of his Special Committee, both in regard to the general plan of his work and in connection with individual courses of study. A candidate for an advanced degree must present to the Dean, not later than two weeks after registration in the Graduate School, a statement of his Major and Minor Subjects, approved by the members of his Special Committee.

Changes in the personnel of his Special Committee may be made by a graduate student with the approval of the continuing members. Any vacancy on a Special Committee, due to the absence of a member on leave from the University, is filled by the Dean on recommendation by the member on leave and with the consent of the student and the added member. Any graduate student who desires an examination in the summer must arrange for any necessary examining substitute on his Special Committee and file with the Dean before the first of June preceding the examination notice of such arrangement together with written approval both of the substitute and of all the members of the Special Committee.

The work of each graduate student who is not a candidate for a degree is in charge of an Adviser selected by the student from the members of the Faculty representing his field of work. A student who is not a candidate for a degree must present to the Dean, not later than two weeks after registration, a detailed statement of the studies selected, approved by his Adviser.

RESIDENCE

Residence credit toward an advanced degree is granted to regularly enrolled students only upon the satisfactory completion of a term or other period of work, attested by the members of the student's Special Committee.

Credit for Work Done in Cornell University

Residence credit for work *in the University* may be acquired in three ways:

(1) By the satisfactory completion of a term or portion of a term of work during the regular sessions of the University.

(2) By the satisfactory completion of work done in a Summer Session of Cornell University, in the Summer School in Agriculture, or in the Summer School of Biology.

Residence credit for this work may be counted toward the degrees of Master of Arts, Master of Science, and Master of Science in Agriculture, and, on recommendation of the student's Special Committee, toward the degree of Doctor of Philosophy; one term of residence may be acquired by two summer sessions, and one year (or two terms) of work by four summer sessions. All students pursuing graduate studies during one of the Summer Sessions are required to enroll both in the office of the Registrar of the University and in that of the Dean of the Graduate School before beginning work. Candidates for these degrees who are in residence during Summer Sessions only are required also to continue their studies during the year under the direction of the Chairman of the Special Committee in charge of their work. It should be noted that in some departments no graduate work is offered in the Summer Session. A statement of the graduate work offered will be found in the Announcements of the various Summer Sessions, which will be sent upon application to the Secretary of the University.

(3) By the satisfactory completion of a period of work during the summer under the personal direction of a member of the Faculty.

The general library and many of the laboratories and special libraries of the University are open during this period, and certain members of the instructing staff who remain in residence during the summer are willing to assume responsibility for the supervision of the work of students who are qualified to carry on investigations. It is impossible to make any announcement in advance as to what opportunities for graduate work may be found at any definite time in a particular subject; but such information may be obtained by correspondence. Residence credit towards an advanced degree for work carried on under personal direction during the summer will be granted only if the following conditions are complied with: (a) The student must have already completed at least a full year of graduate work as a candidate for an advanced degree, either in this University or in some institution whose graduate work is acceptable. In all cases graduate students are required to register both in the office of the Registrar of the University and in that of the Dean of the Graduate School. No candidate for the Doctor's degree may receive credit for more than two terms of residence during any twelve consecutive months. (b) The student must present to the Dean of the Graduate School a statement from the member of the Faculty under whose direction the student is to work, signifying his readiness to undertake such direction and also stating the number of weeks during which he will be prepared to supervise this work.

Credit for Work Done Elsewhere

Ordinarily a student is expected to spend his full term of residence for an advanced degree at this University. For the Master's degrees no credit may be obtained for work done elsewhere. For the Doctor's degree, however, residence credit for work done elsewhere may be granted in the following cases:

(1) Residence as a graduate student in another university may, on recommendation of the student's Special Committee, be accepted

as the equivalent of residence at Cornell University. No general statement can be made regarding the conditions under which this permission will be granted; each case will be decided on its merits. The last year of required residence must be in Cornell University.

(2) There are certain cases in which, in order to give the work of the Graduate School the greatest possible breadth, it is desirable, from the point of view both of the student and of the University, to take advantage of opportunities for study and research not found in university centers.

The conditions under which a candidate for the degree of Doctor of Philosophy may be allowed residence toward this degree for time spent in study away from the University have been stated in the following form by the legislation of the Faculty: (a) Applicants must be regularly registered in the Graduate School as candidates for the Doctorate, and while not in residence shall receive no compensation except from the University. (b) They shall have spent at least two terms in Cornell University in study towards the Doctor's degree. (c) Permission to count such time as residence may be given by the Dean of the Graduate School for a period not to exceed one term, when the application is unanimously approved by the members of the student's Special Committee. When a longer period of outside study is required, applications for an extension of time should be made to the General Committee, which may, at its discretion, extend the period to two terms. In no event, however, shall a student acquire a total of more than two terms' residence under these provisions. (d) A student who avails himself of this privilege shall continue to work under the general direction of his Special Committee. Whenever possible, however, the work should be carried on under the immediate supervision of a competent director, acting for the Special Committee and to be designated by that Committee. (e) Reports regarding the progress of the work shall be made as directed by the Special Committee at intervals not in excess of one month.

(3) Under conditions to be ascertained from the Dean, instructors in Cornell University who are also registered in the Graduate School may receive credit for work done without compensation during the summer months away from the University.

Graduate students who hold appointments as instructors or assistants in Cornell University may not receive more than three-fourths residence credit for graduate work carried on during the period of their appointment. Such students may, on recommendation of their Special Committee, obtain full graduate residence for the year by carrying on their studies during the summer provided they devote their whole time during this period to graduate study and do not hold a teaching appointment. An instructor or assistant who has completed at least one term of satisfactory graduate work at another university may, however, upon the recommendation of his Special Committee, satisfy the residence requirement for the master's degree by one year at Cornell.

Graduate students who are engaged in other outside work which reduces the time and thought which they are able to give to graduate study will be required to spend more than the minimum period of residence required of candidates for advanced degrees.

Residence Credit Convertible

Residence, whether at Cornell University or elsewhere, in pursuance of work for a Master's degree, may be credited toward the residence required for the degree of Doctor of Philosophy provided the Special Committee in charge of the work approves, certifying the work done as forming an integral part of the work required for the Doctor's degree.

DEGREES

The requirements for advanced degrees are based, not upon courses or credits, but upon the completion of a definite period of residence, the presentation of a satisfactory thesis or essay, and the passing of an examination.

THE MASTER'S DEGREES

Cornell University confers the degrees of Master of Arts, Master of Science, Master of Architecture, Master of Civil Engineering, Master of Mechanical Engineering, Master of Electrical Engineering, Master in Forestry, Master in Landscape Architecture, Master of Chemistry, and Master of Science in Agriculture.

The Master's degree is conferred upon a candidate who, after completing at least one year of residence devoted to the study of a field comprising a Major Subject and one Minor Subject, presents a satisfactory thesis, or essay, as the chairman of the candidate's Special Committee may decide, and passes an examination on his special field.

THE THESIS

The thesis, or essay, must demonstrate the candidate's ability to do independent work, and must be acceptable in style and composition.

A statement of the general subject of the thesis, or essay, with the written approval of the chairman of the Special Committee in charge of the candidate's work, must be filed in the office of the Dean at least six months before the candidate expects to present himself for examination.

The completed thesis, or essay, approved by the Special Committee, must be presented to the Dean at least five days before the examination for the degree, and must remain on file until the day preceding the examination. When the Major Subject for the degree of Master of Architecture or the degree of Master in Landscape Architecture is in Design, the candidate is required to deposit in place of the thesis, either the original drawings or a photographic reproduction of them.

Each candidate for a Master's degree is required to furnish a bound typewritten copy of his thesis, or essay, for the use of the University Library, and this copy is to be delivered to the Dean not less than five days before the degree is to be conferred. The paper on which the thesis is typewritten must be a durable rag bond; the size of the page of the typewritten thesis should be 8 x 10½ inches. This copy of the thesis becomes the permanent property of the Library.

EXAMINATIONS

After this thesis, or essay, has been duly presented and is accepted by the Special Committee, the candidate is required to present himself for examination on his Major and Minor Subjects and on the subject matter of his thesis.

Examinations for a Master's degree may be written or oral, or both, at the option of the examining committee, and are open to all members of the Faculty. The examination for the degree of Master of Architecture may be waived by the General Committee of the Graduate School in any case where, in the opinion of the student's Special Committee, the Major and Minor Subjects are of such a nature as to make an examination impossible or inexpedient.

THE DEGREE OF DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy is conferred upon a candidate who, after completing not less than three years of resident graduate work devoted to the study of a field of work comprising a Major Subject and two Minor Subjects, presents a satisfactory thesis, and passes an examination on his chosen field and on the subject matter of his thesis.

The Doctor's degree is intended to represent, not a specified amount of work covering a specified time, but the attainment, through long study, of independent and comprehensive scholarship in a special field.

A candidate for the Doctor's degree will ordinarily be expected to have a working knowledge of French and German before beginning graduate work. In all cases he must, before beginning his second year of residence, show to the satisfaction of his Special Committee that he possesses a reading knowledge of these languages.

QUALIFYING EXAMINATIONS

Candidates for the degree of Doctor of Philosophy are required to pass a Qualifying Examination, to be held normally not later than the close of the second year of residence. The legislation of the Faculty on this subject is given in the following paragraphs:

(1) The qualifying examination or examinations required of a candidate for the degree of Doctor of Philosophy shall be held at such time as his Special Committee may determine, normally not later than the close of the second year of residence. No candidate may proceed to his final examination until two terms have been completed after he has passed the qualifying examination.

(2) The Special Committee shall pass upon the results of this examination as a whole, and shall report to the Dean whether the candidate has made satisfactory progress and is qualified to proceed in due order to complete the requirements for the degree.

(3) The Special Committee, in the case of any candidate, may waive the qualifying examination in whole or in part; but the Committee shall nevertheless report to the Dean whether the candidate has made satisfactory progress and is qualified to proceed in due order to complete the requirements for the degree.

(4) If a candidate fails to pass the qualifying examination, no re-examination shall be allowed except on the recommendation of the Special Committee.

THESIS

The thesis for the Doctor's degree must give evidence of the candidate's power to carry on independent investigation and must be satisfactory in style and composition. A statement of the general subject of the thesis, with the written approval of the chairman of

the Special Committee in charge of the candidate's work, must be filed in the office of the Dean at least six months before the candidate expects to present himself for examination. The thesis of a candidate intending to take his degree at the June commencement should normally be completed by May 15, in order that ample time may be afforded for the inspection of the thesis by all members of the Special Committee. The completed thesis, approved by the Special Committee, is to be presented at the office of the Graduate School at least five days before the examination for the degree, and must remain on file until the day preceding the examination.

Each candidate for the Doctor's degree must meet one of the following requirements:

(1) He must deposit in the office of the Dean of the Graduate School one hundred printed copies of his thesis for the purposes of the University Library; *or*

(2) He must deposit in the office of the Dean of the Graduate School two bound typewritten copies of his thesis. At the same time he must present one hundred printed copies of an abstract or description of his thesis, which must be approved by his Special Committee, or a typewritten copy of the abstract, which in such a case shall not exceed fifteen hundred words, and the sum of twenty-five dollars to defray the expenses of printing. All students are recommended to publish their theses in full; and any successful candidate for the doctor's degree who before the end of one year after the granting of the degree shall have deposited one hundred printed copies of his thesis or presented evidence of the acceptance of the thesis for publication, shall, on receipt of the one hundred printed copies, have refunded to him the twenty-five dollars deposited for printing the abstract.

The paper on which the thesis is typewritten must be a durable rag bond; the size of the page of the typewritten thesis should be 8 x 10½ inches.

PUBLICATION OF THE THESIS

The candidate should consult with the Dean regarding the form of publication of the thesis. The thesis shall have both a cover and a title-page. The title-page shall include the printed statement that the thesis is presented to the Faculty of the Graduate School of Cornell University for the degree of Doctor of Philosophy. If the thesis is a reprint, the place and date of the original publication must be given.

The attention of present and former graduate students of Cornell University is called to an arrangement whereby theses which have been accepted in fulfilment of the requirements of the doctorate at Cornell University may be published (at the expense of the authors) through the office of the Secretary of the University. The advantages of this arrangement to the writer of a thesis are: prompt and satisfactory publication, with the likelihood of moderate expense and the certainty of good printing; conformity of the individual thesis

to a good style of typography and binding; ease of distribution, with the higher probability that a thesis will be sought and found when it is one of a series than when it is privately owned and separately published.

The writer whose thesis has been accepted by his Special Committee and who wishes to avail himself of the arrangement in question, should apply to the chairman of that Committee, who will make the necessary arrangements for publication through the chairman of the Editorial Committee of the Faculty. This consists, in each case, of three members; the Dean of the Graduate School, the chairman of the Special Committee, and Professor Lane Cooper, the chairman of the Editorial Committee.

FINAL EXAMINATIONS

The final examinations for the doctor's degree may be either oral or written, or both at the option of the examining committee, and are open to all members of the Faculty. The Faculty has, however, expressed the opinion that a written examination should be required for the doctorate at some time during the student's candidacy. In the event of failure in final examination, no re-examination may be held until three months after the completion of the minimum period of residence.

It is not the policy of the Graduate School to divide the final examination for advanced degrees into parts, or to accept piece-meal fulfilment of the requirements for these degrees. In ordinary cases, examinations for advanced degrees are not held until after the candidate has completed the minimum period of residence and presented a thesis duly approved by the members of his Special Committee. But on recommendation of the Special Committee the general examination for the Doctor's degree may be held in the fifth term of residence. If this examination be passed, it must be followed by an examination on the subject matter of the thesis when the completed thesis is presented.

DATES FOR CONFERRING DEGREES

Advanced degrees are conferred in February, June, and September.

In February, degrees will be conferred on students who have made application for the degree on or before the first day of instruction after the Christmas recess, and who have completed the requirements not later than the last day of the final term examinations.

In June, degrees will be conferred on students who have made application for the degree not later than May 15, and who have completed the requirements not later than the last day of the final term examinations.

In September, degrees will be conferred on students who have made application for the degree not later than September 1, and who have completed the requirements not later than the day preceding the first day of instruction of the first term.

TUITION AND OTHER FEES

A Tuition Fee of $75 for the academic year is to be paid by all students registered in the Graduate School. It is payable in installments of $37.50 at the beginning of each term.

Certain classes of students are exempt from the payment of the tuition fee. They are:

(1) Graduate students holding appointments as University Fellows or Graduate Scholars, and holders of certain industrial fellowships and scholarships.

(2) Graduate students holding appointments as assistants and instructors and having their major studies in the college or line of work in which they are instructing, are exempt from the payment of tuition fees and laboratory and shop fees in the department in which they are employed to give instruction; members of the instructing staff who take work for which they must pay tuition are required to pay in proportion to the amount of work for which they are registered.

(3) Graduate students who at the beginning of the college year are and for at least twelve months prior thereto have been *bona fide* residents of the State of New York and whose major work is taken in departments connected with the New York State College of Agriculture, the New York State Veterinary College, or the New York State College of Home Economics.

No student may receive the Master's degree who has not paid the tuition fee for at least one year, and no one may receive the Doctor's degree who has not paid the tuition fee for at least three years, unless one or more of the years spent in study for the Doctor's degree have been spent in graduate study at another university, or unless payment of tuition has been waived under one of the foregoing heads.

Any student of the Graduate School who has completed the requirement of residence for the degree for which he is a candidate, whose studies have been satisfactory to the Faculty, and who during that time has satisfied the requirements as to tuition fees, is, on paying the annual administration fee, exempt from the further payment of tuition fees for a period not to exceed one year.

An Administration Fee of $25 is to be paid by all students registered in the Graduate School. It is payable in installments of $12.50 at the beginning of each term.

A Matriculation Fee of $10 is required of every student upon entrance into the University. It must be paid at the time of registration.

An Infirmary Fee of $5 a term is required of all students (except those registered in the Medical College in New York City) at the beginning of each term. For a statement of the privileges given in return for this fee, see the General Circular of Information.

A Graduation Fee of $20 is required, at least ten days before the degree is to be conferred, of every candidate for an advanced degree. The fee will be returned if the degree is not conferred.

Laboratory Fees. Every person taking laboratory work or courses in which a fee is charged must pay to the Treasurer of the University the required fee or the required deposit for the materials *et cetera* that are to be used in the work.

A Willard Straight Hall Membership Fee of $4 a term is optional. The use of this hall is restricted to those who have paid this fee. The fee is required of all undergraduate students but is optional with graduate students and members of the instructing staff. This fee is payable at Willard Straight Hall.

Fees for the Summer Session. Students of the University Summer Session, the Summer School in Agriculture, and the Summer School of Biology who have been admitted to candidacy for an advanced degree are required to pay the regular tuition fee of the session, $50, but are exempt from tuition and administration fees in the Graduate School. On registering for the first time as a candidate, a student who has not previously matriculated in Cornell University will be matriculated without payment of the usual matriculation fee on presenting a certificate that he has paid the tuition charges for the current Summer Session. Students registering in the Graduate School who have been excused from tuition in the Summer School in Agriculture as residents of New York State are charged, on their first registration in the Graduate School, a matriculation fee of $10 and for each session an administration fee of $6.25.

Personal Direction. Students carrying on studies during the summer as candidates for advanced degrees under Personal Direction are required to register with the Registrar as well as in the Graduate School and to pay an administration fee of $10. No administration fee is required of persons who have been regularly appointed members of the instructing staff during the preceding academic year and who have during that year paid the full administration fee.

Tuition and other fees become due when the student registers. The University allows twenty days of grace after the last registration day of each term. The last day of grace is generally printed on the registration coupon which the student is required to present at the Treasurer's office. Any student who fails to pay his tuition charges, other fees, and other indebtedness to the University, or who, if entitled to free tuition, fails to claim it at the Treasurer's office and to pay his fees and other indebtedness, within the prescribed period of grace, is thereby dropped from the University unless the Treasurer has granted him an extension of time to complete payment. The Treasurer is permitted to grant such an extension when, in his judgment, the circumstances of a particular case warrant his doing so. For any such extension the student is assessed a fee of $5 for the first week and $2 additional for each subsequent week in which the whole or any part of the debt remains unpaid, but the assessment in any case is not more than $15. The assessment may be waived in any instance for reasons satisfactory to the Comptroller and the Registrar, when such reasons are set forth in a written statement.

Students registering at any time during the last ten weeks of either the first or the second term are required to pay tuition at the rate of ten per cent of the regular tuition of the term for each week or fraction of a week between the day of registration and the last examination day of the term. Students registering at any time during the last four weeks in the short summer courses are required to pay tuition at the rate of twenty-five per cent of the term's tuition for each week or fraction of a week between the day of registration and the last examination day of the term.

A tuition fee or other fee may be changed by the Trustees at any time without previous notice.

FELLOWSHIPS, SCHOLARSHIPS, PRIZES

Honorary Fellowships

Holders of the Doctor's degree or other persons of recognized standing as scholars who wish to continue work in a field in which they have already achieved distinction may, in the discretion of the

Faculty, be appointed to honorary fellowships. These fellowships cover all fees except laboratory charges. Actual residence at the University and regular registration in the Graduate School are required of appointees.

Fellowships

The following twenty-five fellowships are annually offered in the Graduate School:

1. The Cornell Fellowship in English.
2. The McGraw Fellowship in Civil Engineering.
3. The Sage Fellowship in Chemistry.
4. The Schuyler Fellowship in Animal Biology.
5. The Sibley Fellowship in Mechanical and Electrical Engineering.
6. The Goldwin Smith Fellowship in Botany, Geology, or Physical Geography.
7. The President White Fellowship in Physics.
8. The Erastus Brooks Fellowship in Mathematics.
9. The University Fellowship in Architecture.
10. The University Fellowship in Romance Languages.
11. The University Fellowship in German.
12. The University Fellowship in Agriculture.
13. The Charles Bull Earle Memorial Fellowship in Mechanical and Electrical Engineering.
14. The President White Fellowship in Modern History.
15. The President White Fellowship in Political and Social Science.
16, 17. The Susan Linn Sage Fellowships in Philosophy.
18. The Susan Linn Sage Fellowship in Psychology.
19, 20. The Fellowships in Political Economy.
21, 22. The Fellowships in Greek and Latin.
23. The Fellowship in American History.
24. The Edgar J. Meyer Memorial Fellowship in Engineering Research.
25. The George C. Boldt Fellowship in History.

The President White Fellowships in Modern History and in Political and Social Science have an annual value of $500 each; the George C. Boldt Fellowship in History has an annual value of $1,000; the others have an annual value of $400 each. Some of the Fellows are also exempt from tuition. It is possible that, during the year 1926–27, some modifications may be made in the list of fellowships and graduate scholarships and in certain cases the stipends attaching to them may be considerably increased. In cases where any such change is made applicants will be informed by correspondence.

The President White Fellowships in History and Political Science may, in the discretion of the Faculty of the Graduate School, be made traveling fellowships. The holders of these fellowships are by the terms of the gift called upon to be in attendance for a certain period each day in the President White Library, where they will naturally do a large part of their study. In the case of a student of very exceptional ability and promise in the fields of either of these fellowships, the two fellowships may, in the discretion of the Faculty, be combined for a single year into one.

Special Temporary Fellowships

In addition to the fellowships enumerated above, the income of the Susanna Phelps Gage Fund for research in physics may, by the decision of the professors in the Department of Physics, be devoted to the support of fellowships in Physics. At the present time the following special fellowships are also awarded by the Faculty of the Graduate School: The Grasselli Fellowship in Chemistry, supported by the Grasselli Chemical Company of Cleveland Ohio; the Gypsum

Industries Association Fellowships; the Du Pont Fellowships, supported by E. I. du Pont de Nemours and Company; the Palmolive Fellowship in Chemistry; the Williamson Co-operative Vegetable Association Fellowship; the National Canners' Association Fellowship in Chemistry; the Western New York Farms Corporation Fellowship; the Union Sulphur Company Fellowship; and the Bayer Fellowship in Plant Pathology. It is impossible at the present time to announce these fellowships as annually awarded to applicants. Information in regard to them may at any time be obtained by correspondence with the respective departments.

Graduate Scholarships

The following eighteen graduate scholarships are offered annually in the graduate school.

1–5. The Susan Linn Sage Graduate Scholarships in Philosophy.
6. The Susan Linn Sage Graduate Scholarship in Psychology.
7. The Graduate Scholarship in Mathematics.
8. The Graduate Scholarship in Chemistry.
9. The Graduate Scholarship in Physics.
10. The Graduate Scholarship in Civil Engineering.
11. The Graduate Scholarship in Latin and Greek.
12. The Graduate Scholarship in Archaeology and Comparative Philology.
13. The Graduate Scholarship in Animal Biology.
14. The Graduate Scholarship in Botany, Geology, or Physical Geography.
15. The Graduate Scholarship in English.
16. The Graduate Scholarship in History.
17. The Graduate Scholarship in Architecture.
18. The Graduate Scholarship in Veterinary Medicine.

The graduate scholarships, with the exception of the Scholarship in Architecture, have an annual value of $200 each. Some of the holders of graduate scholarships are also exempt from tuition. The Graduate Scholarship in Architecture grants only free tuition.

On the recommendation of the Faculty of the Graduate School a fellowship may be divided for a single year into two graduate scholarships, the value of each to be one-half of the divided fellowship. But no fellowship may be thus divided oftener than once in two years.

Award and Tenure

Appointments to fellowships and scholarships for the ensuing year are made by the faculty, upon recommendation of the professors concerned, on April 1 of each year.

Official forms for making application for fellowships and graduate scholarships may be obtained from the Dean of the Graduate School. All applications should be filed in the office of the Dean on or before March 15 of the academic year preceding the one for which application is made. Before this application is filed, the applicant should have convinced himself by correspondence that he is eligible for admission to the Graduate School of this University in full standing, since appointments are given only to those who are eligible for admission to candidacy for an advanced degree.

All other information, papers, and testimonials should be submitted on or before March 15 to the department in which the appli-

cant desires to carry on the principal part of his work. Applicants are advised to submit any published or unpublished papers or reports showing the result of their study or research which might serve to indicate the extent of their knowledge of the subject, their command of the methods and tools of research, and their capacity generally for clear written expression. Candidates who are graduates of other colleges or universities should submit recommendations from the instructors best acquainted with their ability and attainments. It should be borne in mind that information cannot be too exact or detailed in the case of students not personally known to the appointing body.

The term of each fellowship and graduate scholarship is one year, but the term may under exceptional circumstances be extended to two years.

Students holding fellowships or graduate scholarships are not free to accept other appointments, but will be expected to devote their time uninterruptedly to the prosecution of their studies.

The moneys due on fellowships and graduate scholarships are paid at the office of the Treasurer of the University in six equal payments on October 15, December 1, January 15, February 15, April 1, and June 1.

The Graduate Prize in Philosophy

The Graduate Prize in Philosophy has an annual value of about twenty-five dollars, and is open for competition to all students registered in the Graduate School of Cornell University.

The prize will be awarded to the graduate student who submits the best paper embodying the results of research in the field of philosophy. To be acceptable, the paper must show independent scholarship and research in dealing with philosophical ideas. The subject of the paper may be either historical or critical and constructive in character. It may be concerned either with problems of pure philosophy or with the philosophical bearing of the concepts and methods employed in mathematics or in any of the natural or humanistic sciences.

Papers submitted in competition must be deposited in the office of the Dean of the Graduate School on or before the first of May. Each paper is to be typewritten, and must bear a fictitious signature and be accompanied by the name of the writer in a sealed envelope.

The prize will be awarded by a committee appointed by the President of the University. A copy of the successful paper is to be deposited in the University Library by the Dean of the Graduate School.

THE UNIVERSITY LIBRARIES

Willard Austen, *Librarian;* E. R. B. Willis, *Assistant Librarian;* G. L. Burr, *Librarian Emeritus of the President White Library;* Halldor Hermannsson, *Curator of the Icelandic Collection;* G. L. Hamilton, *Curator of the Dante and Petrarch Collections;* E. E. Willever, *Librarian of the Law Library;* W. W. Ellis, *Librarian of the Agricultural College Library.*

The University Libraries comprise the General Library of the University, the Seminary Libraries in the General Library Building,

the Architectural Library, the Chemical Library, the Sibley Engineering Library, the Civil Engineering Library, the Law Library, the Flower Veterinary Library, the Barnes Hall Library, the Goldwin Smith Hall Library, the Van Cleef Memorial Medical Library, the Library of the New York State College of Agriculture, and the Library of the New York State Agricultural Experiment Station at Geneva. The total number of bound volumes in them is now over seven hundred and fifty thousand. The number of periodicals, transactions, and other serials, currently received, is over two thousand, and of most of these complete sets are on the shelves.

Among the more important special collections in the General Library are:

THE ANTHON LIBRARY, of nearly seven thousand volumes, comprising works in classical languages and literatures, besides history and general literature.

THE BOPP LIBRARY, of about twenty-five hundred volumes, relating to the Oriental languages and literatures, and comparative philology, being the collection made by Professor Franz Bopp of the University of Berlin.

THE GOLDWIN SMITH LIBRARY, of thirty-five hundred volumes, comprising chiefly historical works and editions of the English and ancient classics presented to the University in 1869 by the late Professor Goldwin Smith, and increased during later years by the continued liberality of the donor.

THE WHITE ARCHITECTURAL LIBRARY, a collection of over twelve hundred volumes relating to architecture and kindred branches of science, given by the late President White, which is being added to from year to year.

THE KELLY MATHEMATICAL LIBRARY, comprising eighteen hundred volumes and seven hundred tracts, presented by the late William Kelly, of Rhinebeck.

THE SPARKS LIBRARY, being the library of Jared Sparks, sometime President of Harvard University, consisting of upward of five thousand volumes and four thousand pamphlets, relating chiefly to the history of America.

THE MAY COLLECTION, relating to the history of slavery and anti-slavery, the nucleus of which was formed by the gift of the library of the late Rev. Samuel J. May of Syracuse.

THE SCHUYLER COLLECTION of folk-lore, Russian history, and Russian literature, presented by the late Eugene Schuyler in 1884.

THE PRESIDENT WHITE HISTORICAL LIBRARY, the gift of the late President White, received in 1891, and since largely added to by gift and purchase, especially rich in the primary sources of history, containing notable collections on the period of the Reformation, on the English and French Revolutions, on the American Civil War, and on the history of superstition.

THE SPINOZA COLLECTION, numbering four hundred and fifty volumes presented in 1894, by the late President White.

Four remarkably rich collections given by the late Willard Fiske, comprising the DANTE COLLECTION, containing over eight thousand volumes, the PETRARCH COLLECTION, containing about four thousand volumes, the RHAETO-ROMANIC COLLECTION, containing about thirteen hundred volumes, and the ICELANDIC COLLECTION, containing over fifteen thousand volumes.

THE ZARNCKE LIBRARY, containing about thirteen thousand volumes and pamphlets, especially rich in Germanic philology and literature, purchased and presented in 1893 by William H. Sage.

THE HERBERT H. SMITH COLLECTION of books relating to South America, purchased in 1896.

A valuable collection of books on French and Italian Society in the 16th and 17th centuries, presented by Professor T. F. Crane in 1896.

THE FLOWER VETERINARY LIBRARY, the gift of Roswell P. Flower to Cornell University, for the use of the State Veterinary College, in 1897.

THE EISENLOHR LIBRARY, containing about one thousand volumes on Egyptology and Assyriology purchased and presented in 1902 by A. Abraham.

THE BAYARD TAYLOR correspondence and journals and his collection of Goethe literature, presented to the Library, in 1905, by Mrs. Marie Taylor.

THE ANGLO-SAXON COLLECTION and the COWPER COLLECTION formed by the late Professor Hiram Corson, bequeathed to the Library, and received in 1911.

THE ENGLISH COLLECTION presented by Professor J. M. Hart in 1914.

THE GUITEAU INSURANCE LIBRARY, purchased in 1916.

THE CHARLES WILLIAM WASON COLLECTION of books dealing with China and the Chinese, bequeathed to the University by C. W. Wason, '76, in 1918.

THE JAMES VERNER SCAIFE COLLECTION dealing with the Civil War in the United States, given by J. V. Scaife, '89, in 1919.

THE BERNARD A. SINN COLLECTION of naval biography and history, given by B. A. Sinn, '97, in 1919.

THE ROLLIN A. HARRIS COLLECTION of mathematical books given for the use of the Department of Mathematics by Mrs. R. A. Harris.

THE EMIL KUICHLING COLLECTION of works dealing with sanitary science given for the use of the Engineering College, by Mrs. Kuichling.

THE LAW LIBRARY of forty-seven thousand volumes containing an unusually complete collection of American, English, and Colonial reports with complement of textbooks and statutes, and complete sets of all leading periodicals in English.

THE BENNO LOEWY COLLECTION of books in general literature, law, free-masonry, Shakespeariana and dramatic literature, autographs and portraits.

These collections and others such as these, making possible an exhaustive study of certain fields, are of the greatest service in research work. A similar purpose is served by the seminary rooms of the University Library. Thus, for the study of English, of the classical languages, of the Germanic and Romance languages, of philosophy, of politics and economics, of American and of European history, there have been provided in the library building seven of these research rooms, each equipped with a carefully chosen body of reference books, to which advanced students in these fields have access. In connection with the scientific and technical laboratories similar collections have been formed and well supplied with reference books, standard works, and sets of periodicals, conveniently arranged for study and research.

Cards of admission to the shelves in the stackrooms and to the White Historical Library will be issued to graduate students for the purpose of consultation and research. The privilege of taking books for home use is granted to all students who comply with the library regulations.

LECTURES IN BIBLIOGRAPHY. As a part of the work of the General Library, Mr. Willis, assistant librarian in charge of the readers division, offers a series of informal talks to graduate students in the second term on the resources and facilities of the Library and on the employment as aids to research of the general bibliographical helps.

FIELDS OF INSTRUCTION

In the following pages are outlined the opportunities for graduate study in the various subjects taught in the University. The subjects are grouped in broad fields. An asterisk (*) preceding the title of a special field of study indicates that this is a field which may be chosen as a Major or Minor Subject. Under each subject there is usually given a statement of (1) the special facilities and encouragements for work in that subject, (2) the general prerequisites for advanced work in the subject, (3) courses of instruction for graduates and undergraduates or primarily for graduates, and opportunities offered for the direction of individual investigation in the subject.

More detailed information concerning any one of these various courses (time and place of meeting, and in the case of a few courses given in alternate years whether or not offered in 1926–27, etc.) will be found in the separate announcement of the college in which the particular course is given. The latest edition of any of these special announcements of the several colleges may be obtained by application to the Secretary of the University.

THE FINE ARTS

Architecture

Professors F. H. Bosworth, C. A. Martin, O. M. Brauner, A. C. Phelps, George Young, jr., Christian Midjo, L. P. Burnham, G. R. Chamberlain, W. K. Stone, and H. E. Baxter.

Graduate work is offered in architectural design, in the history of architecture, in painting and sculpture, in advanced construction, and in drawing, painting, modeling, and decoration.

Candidates for the degree of Master of Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this University for the degree of Bachelor of Architecture. Architectural Design, History of Architecture, and Architectural Construction are offered as major subjects for the Master's degree; Landscape Design; Drawing, Painting, Modeling, and approved courses in other departments of the University may be elected as minor subjects.

The facilities for graduate work in architecture are excellent. Large, well lighted drafting-rooms and studios are provided and a special architectural library, comprising several thousand books, photographs, lantern slides, and numerous original drawings, is situated in White Hall where it is easily accessible to the student.

Instruction is given by means of lectures, seminary discussions, and especially by direct personal criticism and advice.

*Architectural Design. Professors Bosworth and Burnham.

*History of Architecture. Professor Phelps.

*Architectural Construction. Professors Martin, Young, and Baxter.

*Drawing and Painting. Professors Brauner, Midjo, Chamberlain, and Stone.

*Modeling. Professor Midjo.

Landscape Architecture

Professors E. Gorton Davis, R. W. Curtis, E. D. Montillon, and Edward Lawson, and the Faculty of Architecture.

Graduate work is offered in landscape design, in history of landscape architecture, and the use of plants in design.

Candidates for the degree of Master in Landscape Architecture must have had preliminary training in the subjects elected for graduate work equivalent to that required in like subjects in this University for the degree of Bachelor of Landscape Architecture. Landscape Design, the History of Landscape Architecture, and Planting are offered as major subjects for the Master's degree; Architectural

Design, Drawing, Painting, and Modeling, and approved courses in other departments of the University may be elected as minor subjects. A general seminary in landscape Architecture is offered by Professor Davis.

*Landscape Design. Professors Davis, Montillon, and Lawson.

*Planting Design. Professor Curtis.

*History of Landscape Architecture. Professor Davis.

*Music

Professor Otto Kinkeldey.

Graduate work in music will lay special emphasis upon the musicological aspect of the subject, that is, upon the application of the methods of modern philological, philosophical, historical, and literary scholarship and research to the whole field of musical art in all its phases and ramifications, and its interrelation with science, literature, and the other arts.

A knowledge of musical theory and form, not necessarily a composer's ability, is indispensable; also a limited ability to play the piano. A reading knowledge of one or more of the important modern languages (French, German, Italian) is highly desirable.

Work in the field may be chosen as a major subject or a minor for the Master's degree and as a minor for the Doctor's degree.

For Graduates and Undergraduates

The History of Music. A complete survey of the evolution of the art of music, with particular reference to questions of style and to the place of music in the artistic and social life of nations. First term, the music of primitive nations, of antiquity, and of the Middle Ages. Second term, from the Sixteenth century to the present day.

John Sebastian Bach: His Life and Works. With particular reference to the style of the greatest musician before Beethoven. First term.

The Pianoforte and its Music. A study of the changes in style and in the evolution of technique as shown in the works of the great composers and the influence of the masters of the keyboard. Second term.

Primarily for Graduates

Seminary in Musicology. The work is intended to acquaint the student with the accomplishment of the past and with modern aims and methods in the field of musicology, and to afford him some practice in independent musical research and study. Special topics, or fields of study such as musical folklore; primitive music; theories of hearing; consonance and dissonance; developments in modern harmony; the development of musical instruments; the evolution of pianoforte music; the Lied; Italian opera in the nineteenth century, and the like will be selected for each term after consultation with the class.

LANGUAGES AND LITERATURES

*Semitic Languages and Literatures

Professor Nathaniel Schmidt.

Special facilities for advanced work in these subjects are: (1) a collection of several hundred squeezes of inscriptions found in Syria and Arabia Petraea, chiefly in Arabic, Hebrew, Syriac, Assyrian, Nabataean, and Greek; (2) squeezes of Old Egyptian, Coptic, and Hittite inscriptions; (3) a collection of several thousand photographs taken in Syria and Arabia Petraea and slides taken from these photographs; (4) reproductions of inscriptions and objects of art in the Museum of Casts; (5) a valuable collection of Arabic, Hebrew, Samaritan, Ethiopic, and Coptic manuscripts secured in Syria; (6) the Eisenlohr Library, especially rich in Egyptology; (7) the Fiske collection of Arabic books; (8) a growing collection of Egyptian antiquities.

To the candidate for an advanced degree, opportunities are offered of studying every Semitic language and dialect, and also Sumerian, Old Egyptian, and Coptic.

The student may, if he so chooses, specialize in Semitic literature or in Oriental history. A candidate for the Master's degree or the Doctor's degree, with Semitic languages as a major subject, must have had a year of elementary Hebrew or Arabic; and a candidate for either of these degrees, with Oriental history as a major subject, must have had one year of ancient history and one year either of the history of Asia or the history of Africa before entering upon the graduate course.

ADVANCED HEBREW. NEO-HEBRAIC. ETHIOPIC. ASSYRIAN. SUMERIAN. ARAMAIC (Mandaic, Babylonian Talmudic, Syriac, Nabataean, Palmyrene, Galilean, Samaritan, and Judean). ARABIC (Sabaean and Minaean, Classical, Modern). EGYPTIAN. COPTIC. COMPARATIVE SEMITIC PHILOLOGY. SEMITIC EPIGRAPHY (in Semitic Seminary). HEBREW LITERATURE (in Semitic Seminary).

See also ORIENTAL HISTORY.

THE CLASSICS

Professors H. C. ELMER, C. L. DURHAM, E. P. ANDREWS, H. L. JONES, J. F. MOUNTFORD, and HARRY CAPLAN.

Admission to graduate study in a subject included in the group of the Classics, except in archaeology, assumes a knowledge of the field selected equivalent in general to that expected of a student who has pursued the subject concerned throughout four years of undergraduate study in a college of recognized standing.

Graduate work in the Classics is conducted in the main by the seminary system, the object of which is training in the methods, the principles, and the performance of independent research and criticism, and the work is therefore as far as possible put into the hands of the students themselves. Subjects other than those investigated in one of the seminaries of the year are ordinarily presented by courses of lectures.

Two seminary rooms in the Library Building are reserved for the exclusive use of graduate students in the Classics. In addition to the various complete sets of philological and of archaeological journals and standard works of reference in these rooms, the general University Library is at the disposal of the graduate students; stack permits are available when required, and special collections of books can be transferred from the general library to the seminary rooms when needed.

Two fellowships in Greek and Latin; a scholarship in Greek and Latin; and a scholarship in Archaeology and Comparative Philology are awarded annually.

The Charles Edwin Bennett Fund for Research in the Classical Languages yields an annual income of three hundred dollars which may be used each year in the way best suited to promote the object for which the fund was established.

*GREEK

Primarily for Undergraduates

HERODOTUS; DRAMATIC POETRY; PLATO; LYSIAS; DEMOSTHENES; LYRIC POETRY; THUCYDIDES; THE NEW TESTAMENT.

HOMER'S ILIAD OR ODYSSEY. Assistant Professor CAPLAN.

ADVANCED GREEK COMPOSITION. Professor JONES.

THE MYTHS OF THE EPIC CYCLE. Professor JONES.

THE ODES OF PINDAR. Professor JONES.

LECTURES ON GREEK LITERATURE. Professor MOUNTFORD.

Primarily for Graduates

GREEK SEMINARY. Professor JONES. Lysias: the rise and development of Greek Oratory; Athenian legal procedure; a reading of all the extant speeches of Lysias with a study of special textual problems; or Greek Historical Geography: the geography of Homer in the Odyssey, a study based on Strabo's Geography and Bérard's *Les Phéniciens et L'Odyssée:* also special problems connected with the text of Strabo.

GREEK SEMINARY. Professor MOUNTFORD. The works of Aeschylus: their literary value and relation to the history of Greek tragedy; textual and metrical problems of the Oresteia.

ANCIENT MUSIC. Professor MOUNTFORD.

ANCIENT RHETORIC. Assistant Professor CAPLAN.

See also PLATO'S REPUBLIC (under *PHILOSOPHY*), INDO-EUROPEAN PHILOLOGY and PALAEOGRAPHY AND THE PRINCIPLES OF TEXTUAL CRITICISM (under *LATIN*), and METHODS OF LITERARY AND LINGUISTIC STUDY (under *ENGLISH*).

*LATIN

Primarily for Graduates

LATIN SEMINARY. Professor ELMER. The textual, exegetical, and historical study of the works of Virgil and their influence in medieval and modern times.

LATIN SEMINARY. Professor DURHAM. The MS tradition of Cicero's oratorical works; Plautus; Cicero's Orator and the Doctrine of Prose Rhythm; problems in Latin pronunciation and versification; or Catullus and Alexandrianism.

LATIN SEMINARY. Professor MOUNTFORD. The works of Horace: their literary and historical significance with the textual and metrical problems presented.

INDO-EUROPEAN PHILOLOGY. Professor DURHAM. Phonetics; the principles, methods, and results of the comparative philology of the Indo-European family of languages.

HISTORICAL LATIN SYNTAX. Professor ELMER. With special reference to the moods and tenses of the Latin verb.

LATIN WRITING. Professor ELMER.

VULGAR LATIN. Professor DURHAM. The sounds, flexions, and syntax of informal Latin; the extension and the characteristics of the spoken language under the Empire. Primarily for students of Latin who are interested also in the history of the Romance languages.

PALAEOGRAPHY AND THE PRINCIPLES OF TEXTUAL CRITICISM. Professor MOUNTFORD. Study of the development and varieties of scripts with applications to the texts of standard authors.

LATIN GLOSSARIES AND SCHOLIA. Professor MOUNTFORD.

LATIN EPIGRAPHY. Professor DURHAM. The earlier republican and the later imperial inscriptions (including Christian inscriptions) will be studied primarily for their linguistic value; the late republican inscriptions and those of the early Empire will be considered more particularly with reference to their historical content.

SOUNDS AND FLEXIONS OF LATIN; THE ITALIC DIALECTS. Professor DURHAM. The sounds and flexions of Latin from the earliest period down to the time of Augustus; the Oscan and Umbrian dialects.

ROMAN ANTIQUITIES. Professor DURHAM. The topography and architectural remains of ancient Rome; Roman private life.

ROMAN ORATORY. Assistant Professor CAPLAN.

*GREEK ART AND ANTIQUITIES

Professor E. P. ANDREWS.

The Museum of Casts furnishes abundant material for the study of Greek sculpture and for most branches of Greek archaeology. Several hundred squeezes bring the most important Greek inscriptions within reach for independent work in Greek epigraphy.

GREEK EPIGRAPHY, in Seminary. The Greek alphabets and illustrative inscriptions, working chiefly from squeezes.

GREEK ARCHAEOLOGY, in Seminary. The pre-hellenic civilization; Greek vases, coins, terracottas, gems, metal-work, painting, architecture.

HISTORY OF GREEK SCULPTURE, in Seminary.

MODERN GREEK, WRITTEN AND COLLOQUIAL.

PAUSANIAS, AND THE TOPOGRAPHY OF GREECE, with especial reference to Athens.

*ENGLISH LANGUAGE AND LITERATURE

Professors M. W. SAMPSON, WILLIAM STRUNK, Jr., LANE COOPER, F. C. PRESCOTT, C. S. NORTHUP, J. Q. ADAMS, B. S. MONROE, L. N. BROUGHTON, F. M. SMITH, J. W. HEBEL, and F. E. FISKE; *Doctor* W. H. FRENCH.

Among the books available to the student are complete sets of the publications of the Early English Text, Chaucer, Scottish Text, Percy, English Dialect, Shakespeare, New Shakspere, Spenser, Philological, Malone, and other societies; of the Arber, Bullen, Grosart, and Farmer reprints; and of all the important periodicals dealing with the English language and literature. Most of the American and foreign dissertations on English subjects, standard and other editions of individual authors, English and American, and several special collections are also in the Library, which is exceptionally rich in the field of Old and Middle English, and in the Elizabethan and Victorian periods. The Hart Memorial Library, founded by the late Professor James Morgan Hart, contains valuable collections in the bibliography of English philology. This library, in Goldwin Smith Hall, is for the use of graduate students and members of the Faculty. The Department has also a seminary room in the University Library. A fellowship and a scholarship are annually awarded. *The Cornell Studies in English*, a series of monographs issued by the Department, affords some opportunity for the publication of work accomplished by graduates as well as by members of the staff. Nine volumes have appeared.

Candidates for an advanced degree may take their major subject in literature or in language. In general, thirty-six hours (i.e., three full years) of college English are required before a student may enter upon candidacy for an advanced degree. Work in philosophy, history, and languages, ancient and modern, may, at the discretion of the candidate's special committee, be counted against a shortage in undergraduate English. Training in the Greek and Latin literatures is especially desirable as preparation for graduate work in English. All candidates must have a reasonable familiarity with Old and Middle English; must have a general knowledge of English literature and English history; and must accomplish satisfactory work in research. Candidates for the Master's degree must have sufficient knowledge of French or German to make use of scholarly work in one of those languages, and candidates for the Doctor's degree must have a similar knowledge of both French and German, and a reading knowledge of Latin.

History of English Literature. Professor Strunk. Lectures on English literature with reading and reports. (Second term only, in 1926–27.)

[Chaucer. Professor Strunk. First term: preliminary study of Chaucer's life and times; reading in the shorter poems. Second term: the *Canterbury Tales*. Not given in 1926–27.]

Shakespeare. Professor Strunk. First term: the comedies; second term: the tragedies.

Eighteenth Century Poetry. Assistant Professor Monroe. English poets of the Restoration and the eighteenth century: Dryden, Pope, Thomson, Gray, Collins, Goldsmith, Cowper, and Burns; the lesser English and Scotch poets; beginnings of the English Romantic movement.

Eighteenth Century Prose. Assistant Professor Broughton. Defoe, Swift, Addison, Steele, Johnson, Goldsmith, and Burke.

The English Drama to 1642. Professor Adams. First term: the origin of the drama; miracles; moralities; interludes; the first regular comedies and tragedies. Second term: the predecessors, contemporaries, and successors of Shakespeare.

Shakespeare. Professor Adams. The chief plays of Shakespeare, studied with reference to dramatic technique.

Modern Novelists. Professor Sampson. A study of some of the representative works of Meredith, Hardy, Henry James, and Conrad.

American Literature. Professor Prescott. American literature of the Colonial and Revolutionary periods; the growth of literary independence; Irving, Bryant, and Cooper. American prose and poetry of the nineteenth century.

Byron and Shelley. Professor Prescott. In 1926–27: A study of Byron's life, his principal works, and his influence. First term.

Pastoral Poetry. Assistant Professor Broughton. A study of the sources, origin, and development of the appreciation of rustic life and landscape in English poetry. Among the authors considered are Theocritus, Virgil, Spenser, Shakespeare, Fletcher, Jonson, Milton, Pope, Thomson, Collins, Burns, and Wordsworth.

SEVENTEENTH CENTURY POETRY. Assistant Professor HEBEL. A study of the chief poets of the first half of the seventeenth century, including Jonson, Donne, Herbert, Herrick, Vaughan, and Marvell.

VICTORIAN LITERATURE. Professor NORTHUP. Lectures on the chief literary tendencies and characteristics of the period; studies of the leading poets and the greater writers of prose.

OLD ENGLISH. Assistant Professor MONROE. Old English grammar. Reading of selections from the *Old English Chronicle*, King Alfred, Aelfric, and other representative prose texts, and of the simpler poetry. Some study of Middle English will be included in the second term.

OLD AND MIDDLE ENGLISH. Professor COOPER. A study of the foundations of the English language and literature, with emphasis upon literary aspects so far as a proper acquisition of linguistic knowledge shall permit.

THE ARTHURIAN LEGENDS. Professor NORTHUP.

DRAMATIC STRUCTURE. Professor SAMPSON. A study of the principles of dramatic construction, based upon Greek, Elizabethan, classical French drama, and modern drama.

TEACHERS' COURSE. Professor NORTHUP. Lectures, readings, and conferences on the teaching of English in the secondary schools.

OLD ENGLISH LITERATURE. Assistant Professor MONROE. Reading of selected Old English works including *Beowulf* or some of the Cynewulfian poetry; studies in textual criticism and in style and metre; supplementary reading.

DANTE IN ENGLISH. Professor COOPER. Reading for the sake of literary and historical perspective, followed by intensive study of select cantos from the *Divine Comedy*.

PRINCIPLES OF LITERARY CRITICISM. Professor COOPER. A study of the chief ancient and modern theories of poetry, as in the *Poetics* of Aristotle and the critical treatises of Scaliger, Sidney, Jonson, Dryden, Lessing, and Shelley; with constant reference to literary masterpieces.

METHODS OF LITERARY AND LINGUISTIC STUDY. Professor COOPER. Reading in Boeckh's *Encyklopädie*, followed by a study of more recent treatises with special reference to the ancient classics and English.

CHAUCERIAN SEMINARY. Professor COOPER. A survey of essential books and topics, systematic reading of Chaucer's works, and a detailed study of special problems; with a view to the practical development, in the student, of the method of English scholarship.

ENGLISH LITERATURE 1500–1640. Professor ADAMS. A study of the non-dramatic literature of England from the Renaissance to the Restoration, excluding Milton.

METHODS AND MATERIALS IN ELIZABETHAN RESEARCH. Professor ADAMS. A study of the more important works of reference used in research; and a discussion of method in investigation.

WORDSWORTH AND HIS CONTEMPORARIES. Assistant Professor BROUGHTON. A detailed study of the works of Wordsworth; their influence on contemporary English thought and literature; and the works of several of Wordsworth's contemporaries. To each student will be assigned some problem or field of investigation.

PASTORAL POETRY. Assistant Professor BROUGHTON. Studies in the criticism and bibliography of the subject, Elizabethan pastorals and foreign influences on the pastoral.

EARLY MIDDLE ENGLISH. Assistant Professor MONROE. Textual and historical study of Layamon's *Brut*, with special reference to its connection with the Arthurian legend.

MIDDLE ENGLISH LITERATURE. Professor NORTHUP. Studies of the greater writers of the period and of the influences which helped to mold their work.

NINETEENTH CENTURY FICTION. Professor NORTHUP. A seminary course; studies in the development of the novel from Scott to Meredith.

AMERICAN LITERATURE. Professor PRESCOTT. The literary relations of England and America. Provincial and national traits in American literature.

THE DRAMA. Professor SAMPSON. Middleton, and Beaumont and Fletcher.

In addition to directing research beyond the limits of the courses listed above, the members of the instructing staff will supervise original work, either in seminaries or by individual conferences, in the fields here noted:

The English Language; selected topics. Assistant Professor MONROE.
Eighteenth Century Literature. Assistant Professor BROUGHTON.
Milton and Spenser. Assistant Professor HEBEL.
Sixteenth and Seventeenth Century Literature. Professor ADAMS.
The Comparative Study of Literature. Professor COOPER.
The Theory of Poetry and Versification. Professor PRESCOTT.
English Philology. Professor STRUNK.
Poetry. Professor SAMPSON.

*RHETORIC AND PUBLIC SPEAKING

Professors A. M. DRUMMOND, G. B. MUCHMORE, H. A. WICHELNS, ROBERT HANNAH, and HARRY CAPLAN.

Candidates must present the equivalent of three years (i.e. twenty-four hours) of approved college work in public speaking before entering upon candidacy for an advanced degree. Work in English language or literature, philosophy, history, the political and social sciences, and psychology may be counted against a shortage of undergraduate public speaking. Proficiency in English composition, in speaking and in reading must be demonstrated to a committee from the department before admission to full candidacy for an advanced degree. All candidates must satisfy fundamental requirements in voice, speech training, and phonetics; will be expected to acquire a general knowledge of the literature and history of their field; and to do satisfactory work in research.

Candidates for the Doctor's degree will be advised to make English language or literature one of their minor subjects. They must be able to make use of scholarly work in French and German. A working knowledge of Latin and Greek is desirable. It is expected that the candidate will so plan his work that he can devote his last year of preparation chiefly to the thesis.

Candidates for the Master's degree will choose a minor subject in a field appropriately allied to their special studies in public speaking. They will be expected to have a reading knowledge of French or German.

The *Cornell Studies in Rhetoric and Public Speaking* will, from time to time, afford opportunities for publication by graduates as well as by members of the staff.

Further information may be obtained from professors in the department.

For Graduates and Undergraduates

Argument and Debate; Persuasion and the Forms of Public Address; Advanced Voice Training; Dramatic Interpretation.

Primarily for Graduates

CLASSICAL RHETORIC. Assistant Professor CAPLAN.

HISTORY OF RHETORIC AND ELOQUENCE. Assistant Professor WICHELNS.

BRITISH ORATORS. Assistant Professor MUCHMORE. A study including historical, biographical, and critical background, of selected British speeches and addresses.

PRINCIPLES OF RHETORIC. Assistant Professor WICHELNS. Modern views and applications of rhetorical theory.

SPEECH TRAINING. Assistant Professor MUCHMORE. Studies in phonetics, speech training, and the science fundamental to work with normal or defective speech.

THEORIES OF DRAMATIC INTERPRETATION AND PRODUCTION. Professor DRUMMOND.

PEDAGOGICAL PROBLEMS AND METHODS. Professor DRUMMOND.

SEMINARY. Professor DRUMMOND and members of the staff. For the investigation of special subjects in the history, literature, theory, and pedagogy of rhetoric, public discourse, speech training, and dramatic presentation.

Germanic Languages and Literatures

*GERMAN

Professors A. B. Faust, A. W. Boesche, P. R. Pope, and A. L. Andrews.

In the advanced courses in this subject the work is twofold, literary and philological. The history of German literature from the earliest period to the present day is sketched in outline lecture courses with collateral reading. Special topics are selected for detailed study such as the epic and lyric poetry of the Middle High German period, the literature of the Reformation, the classical period, the drama of the nineteenth century, and contemporary literature. The courses offered in philology include the study of Gothic, Old and Middle High German, and Old Saxon. They also afford an introduction to the science of language and the principles of phonetics.

The seminaries in German literature and philology aim to impart the principles and methods of investigation. A teacher's course deals with classroom methods and theories of instruction in the modern languages.

All the work in German is greatly facilitated by an exceptional library equipment. The nucleus was formed by the acquisition of the Zarncke library, one of the largest collections of rare books for the study of German literature and philology ever brought to America. With constant enlargements the library has become one of the most serviceable in the country. The German seminary room in the University Library contains books for ready reference, including philological journals and reviews.

Candidates for advanced degrees in German are expected to have an adequate knowledge of French and Latin. A fellowship in German is awarded annually.

For Graduates and Undergraduates

Lessing's Life and Works. Professor Pope.
Schiller's Dramas. Assistant Professor Andrews.
Schiller's Lyrics and Prose. Professor Boesche.
Goethe's Life and Works. Professor Boesche.
Goethe's Faust. Professor Faust.
History of German Literature. Professor Faust.
Contemporary German Literature. Professor Faust.
Nineteenth Century Drama. Professor Pope.
Middle High German. Professor Pope and Assistant Professor Andrews.

Primarily for Graduates

Teachers' Course in Methods. Professor Faust. Methods of teaching modern languages; examination and criticism of textbooks available for the study of German; requirements for teachers' examinations.

Gothic. Professor Boesche. Streitberg's *Gotisches Elementarbuch: Die Gotische Bibel*, ed. by Streitberg. This course will serve as a general introduction to Germanic philology.

Old High German. Professor Boesche. Braune's *Althochdeutsche Grammatik* and *Althochdeutsches Lesebuch*. A study, mainly linguistic, of the oldest German texts. It should be preceded by the course in Gothic.

Principles of Germanic Philology. Assistant Professor Andrews. A discussion of the fundamental principles of linguistic relationships within the old Germanic dialects. Lectures and illustrative problems. This course should be preceded by those in Gothic and Old High German.

Seminary in German Literature. Professor Faust. A study of special literary problems, as: Goethe's *Faust* II; Lessing's *Hamburgische Dramaturgie;* the Modern *Sturm und Drang* Period; German-American Literature; Problems in German Literature since 1880.

Seminary in German Philology. Professor Boesche. A detailed study of early German texts, such as the smaller Old High German poems, or of questions in Historical German Syntax.

*Scandinavian Languages and Literatures

Professor Halldor Hermannsson.

The Fiske Icelandic Collection in the University Library, comprising about 17,000 books and pamphlets, offers excellent facilities for advanced work in Old Norse-Icelandic language and literature, Norse mythology and heroic legends, runology, and early Scandinavian history, as well as in Modern Icelandic language and literature. The Library also has a small collection of books on the other modern Scandinavian languages and literatures to which some additions are made annually.

Old Icelandic. History of the Old Norse-Icelandic Literature. Norse Mythology. Early Scandinavian History. Modern Scandinavian Languages and Literatures.

Romance Languages and Literatures

Professors J. F. Mason, G. L. Hamilton, O. G. Guerlac, Laurence Pumpelly, G. I. Dale, and M. G. Bishop.

The collection of French and Spanish books in the University Library is very large, and offers excellent facilities for advanced work. Objects of special pride are the unrivalled Dante and Petrarch collections, the gift of the late Willard Fiske, who likewise presented to the University a unique collection of Rhaeto-Romance works. Smaller collections of Portugese, Provençal, and Catalan books are also to be found in the University Library. The seminary library contains several thousand volumes including many sets of bound periodicals. A university fellowship in Romance languages (of the value of $400 and free tuition) is annually awarded.

The courses of study in this department are divided into three categories: those intended primarily for undergraduates, those intended alike for undergraduates and graduates, and those intended primarily for graduates. All candidates for advanced degrees in this department must possess a thorough reading knowledge of Latin, French, and German, before announcing their candidacy. A graduate student in Romance languages should have completed some formal course of study in the language and literature of the language which he intends to select as his major subject, and should have a reading knowledge at least of the languages which he selects as his minor subjects.

A candidate for the degree of Master of Arts whose major subject is in Romance languages is expected to present for the approval of the chairman of his Special Committee, within two weeks after registration day, an outline of the work planned for the year. The thesis, must, before May 1, be submitted for the criticism of the chairman of the candidate's Special Committee. If not already taken, a course in the philology of the language which constitutes their major subject is required of graduate students in their first year of study.

Candidates for the degree of Doctor of Philosophy are expected to follow advanced courses given in the field in which their major subject lies and to take up such work as will give a comprehensive view of the fields in which their minor subjects lie. It is intended that the last year of preparation for this degree shall be spent chiefly upon the thesis. Further information may be obtained from the professors in this department.

*FRENCH

Professors Mason, Guerlac, and Pumpelly.

History of French Literature. Professor Mason and Professor Guerlac.
Literature of the Sixteenth Century. Professor Mason.
Literature of the Seventeenth Century. Professor Guerlac.
Literature of the Eighteenth Century. Professor Guerlac.
Literature of the Nineteenth Century. Professor Mason.
French Philology. Professor Pumpelly.
Medieval Literature. Professor Hamilton.
Modern French Literature Seminary. Professor Mason.

*ITALIAN

Professor HAMILTON.

DANTE. LITERATURE OF THE RENAISSANCE. OLD ITALIAN.

*SPANISH

Professor DALE.

HISTORY OF SPANISH LITERATURE. SPANISH CLASSICAL LITERATURE. LITERATURE OF THE NINETEENTH CENTURY. OLD SPANISH. SEMINARY.

*ROMANCE PHILOLOGY

LOW LATIN. Professor HAMILTON.

OLD PROVENCAL. Professor HAMILTON.

HISTORY AND POLITICAL SCIENCE

The subjects of history, economics, and government have been united since 1887 in the President White School of History and Political Science, which bears the name of the first president of the University in especial recognition of the gift of his valuable collection of historical literature to the University Library.

The aims of the President White School are threefold: first, the advancement of knowledge by investigation and publication in the fields of history, economics, politics, jurisprudence, and social science; second, the training of scholars and teachers in these departments of study; third, the training of men and women for the public service, for business, and for professions such as law, journalism, and philanthropy.

The School issues the *Cornell Studies in History and Political Science*, of which five volumes have appeared. They are:

1. *Money and Credit Instruments in their Relation to General Prices.* By Edwin Walter Kemmerer, Ph.D., now Professor in Princeton University. First edition, 1907. Second edition, 1909.

2. *Sargon of Assyria.* By Albert Ten Eyck Olmstead, Ph.D., now Professor of History in the University of Illinois. 1908.

3. *The Judicial Work of the Comptroller of the Treasury.* By Willard E. Hotchkiss, Ph.D., now Director of the National Industrial Federation of Clothing Manufacturers. 1910.

4. *Social Insurance: An Economic Analysis.* By Robert Morse Woodbury, Ph.D., now Director of Statistical Research, Children's Bureau, U. S. Department of Labor. 1917.

5. *The Liberal Republican Movement.* By Earle Dudley Ross, Ph.D., now Professor of History in the Iowa State College. 1919.

HISTORY

Professors NATHANIEL SCHMIDT, C. H. HULL, J. P. BRETZ, CARL BECKER, WALLACE NOTESTEIN, PRESERVED SMITH, M. L. W. LAISTNER.

A graduate student in history should have a sufficient knowledge of general history and of geography. He should be able to speak and write good English. He should have a reading knowledge of French, of German, and of any other language necessary for the thorough study of his special subject. For work in Medieval History he would need a knowledge of Latin, and for Ancient History both Latin and Greek. It is highly desirable that he should have had the necessary linguistic training as an undergraduate; but deficiencies in this respect may sometimes be made up after entering upon graduate work.

The University Library contains ninety or a hundred thousand volumes dealing with history. In large part these are to be found in the room known as the White Historical Library. Graduate students have immediate access to this rich group of books which, with its many special collections, offers every facility for training in the methods of minute and exhaustive research. The historical seminary rooms in the library building are amply furnished with atlases, cyclopedias, dictionaries, bibliographies, and other useful works of reference, and afford easy access to the shelves of the Library proper.

It has been from the outset the policy of the University, while providing adequately for the symmetrical growth of the Library, to acquire the richer private collections of books which eminent scholars have through a lifetime of study built up as their tools of research. Thus, for the study of Oriental History, Cornell has been endowed with the EISENLOHR COLLECTION on the history of Egypt, with the WASON COLLECTION on the history and the civilization of China, and with that of President White on the history of Palestine. For the study of the Graeco-Roman world, it acquired that of Charles Anthon. For the Middle Ages, it has notable bodies of books on the birth of the Papal state, on the rise of the Carolingian empire, and in general on the relations of Church and State. For the Renaissance, it can boast the unrivaled FISKE COLLECTIONS on Dante and Petrarch and the world of their time. For the age of the Reformation, for the history of superstition and persecution (notably for Inquisition and Index, for the story of witchcraft, for the beginnings of the sciences, for the rise of tolerance), it is equipped with the riches of the PRESIDENT WHITE LIBRARY; and for the study of the French Revolution that library has no equal on this side of the Atlantic, if anywhere outside of France. For the history of America, the University possesses the library of the historian Jared Sparks, with the MAY COLLECTION on American slavery and the SCAIFE COLLECTION on the Civil War. Professor GOLDWIN SMITH enriched it with his working library of English history; it obtained that of Professor Tuttle on Prussia; from Professor Fiske came one singularly complete on Iceland. In a multitude of narrower fields it has been found possible to gather for the special student materials for exhaustive research. Many of these collections are endowed with special funds for their increase; and all have been steadily built up with an eye to the needs of the mature student of history.

Three fellowships and a scholarship are annually awarded to graduate students of history. The President White Fellowship in Modern European History has a value of $500. It may be granted as a travelling fellowship. The Fellowship in American History amounts to $400. The stipend of the George C. Boldt Fellowship in History is $1,000. The Graduate Scholarship in History amounts to $200. Holders of fellowships and graduate scholarships are exempt from the payment of tuition. There are twelve assistantships in history, which are filled preferably by the appointment of graduate students.

The teachers and graduate students of history have formed a History Club, which meets once a month for the reading and discussion of papers on historical topics and for social intercourse.

General courses, not enumerated here, are offered in oriental, ancient, medieval, modern European and English history and in American history, both political and economic. These are intended for undergraduates, but, if supplemented by individual work, one or another of them may sometimes serve the purposes of a graduate student whose previous studies have not given him a general knowledge of its field. A general seminary in historical method is also offered by the Professor of Medieval History.

Each of the professors of history is willing to direct research in his special field, provided the student comes with a topic on which he can work.

*ORIENTAL HISTORY

Professor NATHANIEL SCHMIDT.

THE HISTORY OF AFRICA. A general survey of the political development and the cultural life from the earliest times to the present day, with especial attention to Egypt during the first term, and to Carthage, Cyrenaica, Roman Africa, the Muslim dynasties, and the modern European penetration, during the second term.

A similar course will be given in 1927–28 dealing with the history of Asia, and graduates making Oriental History their major subject must have had a year of Ancient History and a year of either the History of Asia or the History of Africa.

*ANCIENT HISTORY

Professor M. L. W. LAISTNER.

GREEK AND ROMAN HISTORIOGRAPHY. SEMINARY IN ANCIENT HISTORY.

*MEDIEVAL AND RENAISSANCE HISTORY AND INTELLECTUAL HISTORY

Professor PRESERVED SMITH.

For Graduates and Undergraduates

THE MIDDLE AGES. The History of Christendom from the time of Constantine to the dawn of the Renaissance (300–1300) with special attention to the life of society and to the progress of civilization.

THE AGE OF THE RENAISSANCE AND THE REFORMATION. The political, social, and religious history of Christendom during this age of transition (1300–1600 A.D.), with especial attention to the beginnings of modern life and thought.

THE INTELLECTUAL HISTORY OF MODERN TIMES. A genetic account of science, culture, and ideas from about 1580 to the present.

Primarily for Graduates

SEMINARY IN CHURCH HISTORY. An investigation of the sources of ecclesiastical history from the beginning of the second century to the end of the sixteenth; a discussion of the problems involved; together with reading and interpretation of some of the principal documents in the original Latin.

SEMINARY IN LATIN PALAEOGRAPHY AND DIPLOMATICS. An introduction to the sciences of reading and criticizing medieval Latin manuscripts.

SEMINARY IN THE HISTORY OF THE SCIENCE OF THE RENAISSANCE. Reading and interpretation of the most important scientific works written between 1300 and 1700, together with the investigation of typical problems in the history of science.

*MODERN EUROPEAN HISTORY

Professor CARL BECKER.

For Graduates and Undergraduates

THR NAPOLEONIC AGE. A study of the organization of France under Napoleon, the establishment of the empire, the restoration of Europe in 1814–15, and the attempt to establish a European Federation or Concert of the Powers from 1815 to 1825.

THE FEDERATION OF EUROPE. A study of the growth of the idea and practice of internationalism, with particular emphasis on the various projects for a federation of European States which have been advanced since the Seventeenth Century.

THE FRENCH REVOLUTION. A study of French society before 1789, and of the Revolution from 1789 to 1795.

Primarily for Graduates

SEMINARY IN MODERN EUROPEAN HISTORY. Offers an opportunity to do research in the original sources for the French Revolution or in some closely related field of modern history.

*ENGLISH HISTORY

Professor WALLACE NOTESTEIN.

Primarily for Graduates

SEMINARY IN ENGLISH HISTORY. The History of the House of Commons, 1485–1689. Reports. Th 7–9, P. M. *Modern History Seminary Room, Library.*

*AMERICAN HISTORY

Professors C. H. HULL and J. P. BRETZ.

For Graduates and Undergraduates

[CONSTITUTIONAL HISTORY OF THE COLONIES AND STATES. Professor HULL. The establishment of British colonial governments and their transformation into the governments of our States. Study of contemporary documents and correspondence and various interpretations thereof. Not given in 1926–27.]

CONSTITUTIONAL HISTORY OF THE UNITED STATES SINCE 1860. Professor BRETZ. Constitutional questions of current interest with their historical background.

[FOREIGN RELATIONS OF THE UNITED STATES. Professor HULL. From 1775 through the Spanish War. A term paper on an individual topic is required. Not given in 1926–27.]

[THE ESTABLISHMENT OF EUROPEAN EMPIRES IN AMERICA, 1493–1763. Professor HULL. Not given in 1926–27.]

[THE DISINTEGRATION OF EUROPEAN EMPIRES IN AMERICA, 1763–1823. Professor HULL. Not given in 1926–27.]

THE SETTLEMENT OF THE MIDDLE WEST. Professor BRETZ. A survey of westward expansion from 1750 to 1848.

SELECTED TOPICS IN AMERICAN HISTORY. Professor BRETZ. Readings in a selected field during the first term of each year; papers in the same field during the second term.

Primarily for Graduates

SEMINARY IN AMERICAN HISTORY. Professor BRETZ. Designed for practice in discovering, interpreting, and valuing sources and in casting the results of such study into narrative form. The particular topics of study are selected each year with reference to the attainments and needs of members of the class.

*GOVERNMENT

Professors R. E. CUSHMAN, G. E. G. CATLIN, and R. A. MACKAY.

Graduate courses in government afford an opportunity to students to carry on research in that field. As preparation for such work a familiarity with the essentials of American political institutions and of the principal systems of European government is assumed, as well as at least an elementary knowledge of American and English or European history. For 1926–27 research in government will be directed primarily in the fields of Americn Constitutional Law, Political Theory and International Law and Relations, although topics relating more generally to American or European governmental institutions and political problems may also be selected.

The attention of students desiring to do graduate work in the various fields of public law is directed to the opportunities open to them in the Law School. The courses in that School in Administrative Law and Public Officers, Constitutional Law, International Law, Jurisprudence, Labor Law, Municipal Corporations, Public Service and Carriers, Restraints on Business and Industry, and Taxation, may be elected by graduate students with the consent of the professors in charge. (See Announcement of the Law School.) The members of the faculty of the Law School are willing to cooperate in directing the researches of students in their several fields, and to serve as members of the special committees of such students.

For Graduates and Undergraduates

POLITICAL PHILOSOPHY AND SCIENCE. Assistant Professor CATLIN.

COMPARATIVE APPLIED POLITICS. Assistant Professor CATLIN.

INTRODUCTION TO INTERNATIONAL LAW. Assistant Professor MACKAY.

INTERNATIONAL RELATIONS AND PROBLEMS. Assistant Professor CATLIN and Assistant Professor MACKAY.

PROBLEMS IN GOVERNMENT AND ADMINISTRATION. Assistant Professor MACKAY.

CONSTITUTIONAL LAW: THE AMERICAN FEDERAL SYSTEM. Professor CUSHMAN.

CONSTITUTIONAL LAW: FUNDAMENTAL RIGHTS AND IMMUNITIES. Professor CUSHMAN.

SOCIAL AND POLITICAL ETHICS, AND THE PHILOSOPHICAL THEORY OF THE STATE. (See *PHILOSOPHY.*)

THE STATE IN RELATION TO LABOR. (See *ECONOMICS.*)

PUBLIC REVENUES. (See *ECONOMICS.*)

Primarily for Graduates

SEMINARY IN CONSTITUTIONAL PROBLEMS. Professor CUSHMAN. Problems of current interest in American Constitutional Law will be selected for individual research. Students will be admitted upon consultation with the instructor.

SEMINARY IN POLITICS. Assistant Professor CATLIN. An opportunity will be afforded to carry on research in the field of political theory. Students will be admitted upon consultation with the instructor.

SEMINARY IN INTERNATIONAL LAW AND RELATIONS. Assistant Professor MACKAY. Students will be admitted upon consultation with the instructor.

*ECONOMICS

Professors W. F. WILLCOX, H. J. DAVENPORT, DONALD ENGLISH, H. L. REED, S. H. SLICHTER, M. A. COPELAND, and STACY MAY.

A student in economics should have as a preparation for graduate study at least the equivalent of elementary courses in economics, economic history, politics, and social science. If he has not this preparation, he should take such elementary courses as early as possible; he will not ordinarily be allowed to present this preliminary work as partial fulfilment of the requirement for a major or minor in any branch of economics.

The work in economics in the President White School of History and Political Science falls into four divisions; economic theory, finance, social science and statistics, labor. These divisions aim to bring their work into close relationship with social, political, and business life. The members of the Faculty seek to keep in touch with the practical as well as with the purely scientific aspects of the problems treated, and have among their interests the preparation of students for positions in business and in public service.

Three fellowships are awarded annually to graduate students in economics and government. The President White Fellowship in Political and Social Science has a stipend of $500 and each of the other fellowships has a stipend of $400. In addition there are several assistantships, each yielding $250, which are open to graduate students.

For Graduates and Undergraduates

PRINCIPLES OF ECONOMICS. Professor DAVENPORT.

PUBLIC REVENUES. Professor DAVENPORT.

[DEMOGRAPHY OR POPULATION STATISTICS. Professor WILLCOX. Not given in 1926–27.]

INTRODUCTION TO STATISTICAL METHODS. Assistant Professor COPELAND.

ACCOUNTING THEORY AND PROBLEMS. Professor ENGLISH.

MONEY AND BANKING. Professor REED.

MONEY, CREDIT AND FOREIGN EXCHANGE. Professor REED.

CYCLICAL ANALYSIS. Professor REED.

CORPORATION FINANCE. Professor ENGLISH.

TRADE UNIONISM AND RELATED PROBLEMS. Professor SLICHTER.

THE STATE IN RELATION TO LABOR. Professor SLICHTER.

PUBLIC REGULATON OF COMPETITION. Assistant Professor MAY.

TRANSPORTATION AND COMMUNICATION. Assistant Professor COPELAND.

[TRUSTS AND MODERN CAPITALISM. Assistant Professor COPELAND. Not given in 1926–27.]

Primarily for Graduates

VALUE AND DISTRIBUTION. Professor DAVENPORT. A study of the chief problems of current economic theory. The works of the leading economic writers will be critically studied with a view to disclosing the basis of existing divergencies, also to the reformulation of economic doctrine.

[STATISTICS OF INTERNATIONAL MIGRATIONS. Professor WILLCOX. Not given in 1926–27.]

[Social Theory. Professor Willcox. Not given in 1926–27.]

Human Nature and Social Institutions. Assistant Professor Copeland. Theories of social psychology and of the relations between individual human nature and our present social and economic system.

Social Evolution. Assistant Professor Copeland. Theories of the evolution of human institutions and their bearing on the genesis of our present social and economic system.

Case Studies in Corporation Finance. Professor Reed. Individual investigations in the histories of selected business corporations for the purpose of acquiring familiarity with the sources and facility in applying the principles of corporation finance.

Industrial Government. Professor Slichter. An intensive study of the development of government in industry. An effort will be made to discover the basic factors molding governmental institutions in industry and the operation of several representative trade agreements will be studied in detail. A theoretical examination will be made of several of the more important untried proposals.

Problems in Industrial Relations. Professor Slichter. Individual investigations of problems in the fields of trade unionism, labor legislation, the courts and labor, and industrial government.

[The Price System. Assistant Professor Copeland. Not given in 1926–27.]

Seminary in Economics. Required of students taking a major or a minor in economics.

Rural Economy, Farm Management, and Marketing

Professors G. F. Warren, G. N. Lauman, J. E. Boyle, G. P. Scoville, E. G. Misner, W. I. Myers, F. A. Pearson, M. L. Holmes, Leland Spencer, H. A. Ross, V. B. Hart, M. P. Rasmussen, M. S. Kendrick, I. F. Hall, and J. F. Harriott.

For graduate work in the various fields here represented a knowledge of practical agriculture, scientific agriculture, and economics is usually required. For the Doctor's degree in these fields a minor in economics is usually required.

*History of Agriculture

Professor Lauman.

History of Agriculture, History of Agriculture in the United States. Agricultural History Seminar.

*Rural Economy

Professors Lauman, Boyle and Kendrick.

[Rural Economy, General Course. Professor Boyle. Not given in 1926–27.]

Rural Economy, Elementary Course. Professor Lauman.

Rural Economy, Advanced Course. Professor Lauman.

Rural Economy Seminar. Professor Lauman.

Taxation. Assistant Professor Kendrick.

*Farm Management

Professors Warren, Myers, Misner, Scoville, Harriott, and other members of the staff.

Farm Records and Accounts. Assistant Professor Harriott.

Farm Management. Professor Myers.

Business Organization and Management of Successful New York Farms. Professor Scoville. Trips will be taken to successful farms; two or three of them will be two-day trips.

Advanced Farm Management. Professors Warren, Myers, Misner, Scoville, and Pearson.

Agricultural Statistics. Professor Pearson.

Seminar. Professors Warren, Boyle, Myers, Misner, Scoville, Pearson, Holmes, Spencer, and Ross; and Assistant Professors Hart, Rasmussen, Kendrick, Hall, and Harriott.

*MARKETING

Professors MYERS, BOYLE, PEARSON, HOLMES, SPENCER, ROSS, and RASMUSSEN.

ACCOUNTING. Professor HOLMES.

COOPERATIVE MARKETING. Professor MYERS.

COLLECTIVE BARGAINING. Professor BOYLE.

MARKETING. Professors BOYLE, SPENCER, ROSS and RASMUSSEN.

ORGANIZED EXCHANGES AND SPECULATION. Professor BOYLE.

BUSINESS MANAGEMENT. Professor HOLMES.

AGRICULTURAL PRICES. Professor PEARSON.

TRANSPORTATION.

*HOUSEHOLD ECONOMY

Professor FAITH M. WILLIAMS.

For graduate work in the economic problems relating to the household, a knowledge of general economics is a prerequisite. For the Doctor's degree in this field a minor in economics is required. The special problems for research next year will center in studies of changes in living costs for families in farm and village communities as compared with such changes in large cities, and in studies of food costs for families in different situations.

DISTRIBUTION OF FAMILY INCOME AND EXPENDITURE IN THE UNITED STATES. Open to seniors and to graduate students. A survey of the source and the division of income of the people of the United States and of standards of living and their more general economic implications. Assistant Professor WILLIAMS.

SEMINAR IN THE ECONOMIC PROBLEMS OF THE CONSUMER. Open to graduate students and especially qualified seniors. A course in original investigation and field work. Assistant Professor WILLIAMS.

RESEARCH IN THE ECONOMIC PROBLEMS OF THE HOUSEHOLD.

*RURAL SOCIAL ORGANIZATION

Professors DWIGHT SANDERSON and BRUCE L. MELVIN.

Graduate students who desire to register in Rural Social Organization as a major subject should have had a considerable personal experience with rural life and rural institutions. Students should have a general knowledge of sociology, economics, history, and political science. Training in the technical branches of agriculture is highly desirable, and a substantial knowledge of scientific agriculture, including farm mangement and rural economy, is essential. Attention is called to the opportunity for arranging courses of study in the nearly related departments of Rural Education, Rural Economy, and Farm Management, the announcements of which should be consulted. Special attention will be given to affording facilities for graduate study to agricultural extension workers, and those employed in positions of leadership in country life. Investigations will usually require more than one year's residence, but in some cases may be initiated while in residence and completed after the candidate has left the institution.

RURAL LEADERSHIP. Professor SANDERSON. A seminary course for the study of the psychology of rural leadership and the means for discovering and developing local leadership.

THE RURAL COMMUNITY. Professor SANDERSON. A detailed study of the nature of the rural community; its historical development; a comparative study of types of rural communities, and the methods of community development and organization.

THE SOCIAL PSYCHOLOGY OF RURAL LIFE. Acting Professor MELVIN. This course deals with the psychological development of the individual as a member of society, the sociological development and the actions of group, and the relation of these two. General principles are drawn and applied from specific examples. This course seeks to take these principles and designate how they may be used in the rational direction of group life. This is done by an analysis of how group action produces specific results. The dominating rural mores, folkways, and attitudes which arise from the vocation of agriculture and of different types of agriculture, and the activities of rural organizations are given special attention.

THE VILLAGE. Acting Professor MELVIN. This course considers the structure and function of the village, including its historical development in the United States. The relation of the village to the city, to the town, and to the farm are analyzed. Emphasis is also placed on the social organization of the village as it relates to the community and to community organization. Students are given an opportunity to work individual problems with respect to the village.

RESEARCH IN RURAL SOCIAL ORGANIZATION. Investigation of rural social problems; rural social surveys; study of community organization, etc.

SEMINARY. Acting Professor MELVIN. For graduate students taking majors and minors. Special problems and reports.

EDUCATION

*EDUCATION AND RURAL EDUCATION

Professors C. E. BINZEL, J. E. BUTTERWORTH, T. H. EATON, E. N. FERRISS, R. H. JORDAN, P. J. KRUSE, C. B. MOORE, R. M. OGDEN, E. L. PALMER, C. W. SMITH, R. M. STEWART, A. F. WHITE, G. A. WORKS, and *Messrs.* T. L. BAYNE and F. S. FREEMAN.

The educational museum contains collections illustrating the work done in various school grades, statistical charts, a full assortment of textbooks for American and German Schools, including a relatively complete collection of the texts used for industrial training in the German continuation schools, an extensive high school and college exhibit of the raw materials of commerce, a kindergarten and a Montessori exhibit, and other appropriate material.

The educational laboratories contain apparatus for demonstration and instruments of precision for research in school hygiene, the learning process, physical and mental tests, and other psychological phases of education. The equipment is constantly being enlarged and apparatus needed for special investigations is at once procured.

Graduate students selecting education as their major subject will be expected to take a certain amount of their work in the studies that are fundamental to an adequate mastery of educational theory and practice. These fall naturally into two groups, the philosophical and the social. The philosophical studies include psychology, ethics, and the history of philosophy; the social studies include political, social, and economic sciences. Normally graduate study in education presupposes familiarity with the history and principles of education, and with educational psychology. Candidates for advanced degrees whose preparation in this respect is inadequate must make up this deficiency by taking the appropriate undergraduate courses.

The Division of Education offers graduate courses designed for students preparing for educational leadership in the following types of positions: supervisors and teacher trainers; college teachers; extension workers; principals, city and village superintendents; county and district superintendents; and instructors in psychology and education in colleges and normal schools; and for students of child training. The fields of agricultural education, home economics, and rural education are especially stressed.

The department advises the student to select a specific type of professional work as a basis of organizing his graduate study, keeping in mind the requirements of the Graduate School. Reserving the right to determine the fitness of any candidate, the department urges the student to ascertain by correspondence or conference whether or not he can pursue his study here advantageously.

PHILOSOPHY OF EDUCATION. Professor OGDEN.

READINGS IN THE HISTORY OF EDUCATION. Assistant Professor ————.

READING OF GERMAN EDUCATIONAL PSYCHOLOGY. Professor OGDEN.

SECONDARY EDUCATION. Professor JORDAN.

EDUCATIONAL ADMINISTRATION AND SUPERVISION. Professor JORDAN.

THE JUNIOR HIGH SCHOOL. Professor JORDAN.

MENTAL DEVELOPMENT. Professor OGDEN.

EXPERIMENTAL EDUCATION. Dr. FREEMAN.

SEMINARY IN EDUCATIONAL THEORY. Professor OGDEN.
SEMINARY IN EDUCATIONAL PRACTICE. Professor JORDAN.
EDUCATIONAL MEASUREMENT. Mr. BAYNE.
MENTAL MEASUREMENT. Professor WHITE.
STATISTICAL METHODS IN PSYCHOLOGY AND EDUCATION. Mr. BAYNE.
PRINCIPLES OF METHOD. Professor STEWART.
PHILOSOPHY OF EDUCATION. Professor STEWART.
THE PREPARATION OF TEACHERS OF AGRICULTURE. Professor EATON.
THE PREPARATION OF TEACHERS OF HOME ECONOMICS. Professor BINZEL.
SECONDARY EDUCATION IN COUNTRY AND VILLAGE COMMUNITIES. Professor FERRISS.
PRINCIPLES OF RURAL SCHOOL ADMINISTRATION. Professor BUTTERWORTH.
SPECIAL PROBLEMS IN RURAL SCHOOL ADMINISTRATION. Professor BUTTERWORTH.
ADMINISTRATION AND SUPERVISION OF VOCATIONAL AGRICULTURE. Professor WORKS.
PROBLEMS OF EXTENSION TEACHING. Professor EATON.
THE SUPERVISION OF HOME ECONOMICS. Professor BINZEL.
EDUCATIONAL PSYCHOLOGY. Professor KRUSE.
PSYCHOLOGY FOR STUDENTS OF CHILD TRAINING. Professor WHITE.
PROBLEMS OF AGRICULTURAL COLLEGE TEACHING. Professor WORKS.
TEACHING THE ELEMENTARY SCHOOL SUBJECTS. Professor MOORE.
THE TEACHING OF CITIZENSHIP. Professor MOORE.
PRINCIPLES OF SUPERVISION. Professor MOORE.
THE PREPARATION OF TEACHERS FOR RURAL SCHOOLS. Professor BUTTERWORTH.
THE TECHNIQUE OF CURRICULUM BUILDING. Professor FERRISS.
THE THEORY OF VOCATIONAL EDUCATION. Professor EATON.
RESEARCH IN RURAL EDUCATION.
PROBLEMS OF EXTENSION TEACHING. Professor EATON.
GENERAL SEMINARY. First term. Professor WORKS.
SPECIAL SEMINARIES. Second term.

A. EDUCATIONAL PSYCHOLOGY. Professor KRUSE.
B. AGRICULTURAL EDUCATION. Professors EATON, STEWART, and WORKS.
C. RURAL SCHOOL ADMINISTRATION. Professor BUTTERWORTH.
D. RURAL SECONDARY EDUCATION. Professor FERRISS.
E. PROBLEMS OF EXTENSION WORK. Professor EATON.
F. ELEMENTARY EDUCATION. Professor MOORE.

*CHILD TRAINING

Professors NELLIE L. PERKINS and LENOIR BURNSIDE.

The laboratories for graduate work in Child Training are situated in a separate building which was at one time a large residence and which is located in The Circle near the Home Economics Building. Two floors of the building are used for a nursery school. Offices and laboratories as well as the play, rest, and work rooms are located in this building with complete nursery equipment to house, feed and care for thirty pre-school children ranging in age from two to five years.

Psychology for students of Child Training, an undergraduate course in Child Training, or its equivalent, and a year's experience with children, either as a teacher, social case worker, nurse, probation officer, or parent, are prerequisites for graduate work in Child Training. For a Doctor's degree in this field, minors in Psychology and one other biological science are required.

Graduate work in Child Training will be covered by three main types of courses:

1. A course in which a study will be made, first, of all the contributions made to our knowledge of the isolated factors which affect normality in childhood, and, second, of the effects upon the growth and development of children when all factors in so far as they are controllable under nursery school organization and cooperation with the home, are made to approach what is now regarded as optimum. This course will consist of lectures, round table discussions, observation

and direction of young children at work and play under conditions especially adapted to meet their needs.

2. A Seminar: Problems of Child Training. A study of behavior problems characteristic of the pre-school period, with a review of the literature covering the procedure for these special behavior problems.

3. Practice case work in consultation centers and survey of groups of families having pre-school children. Students will be given an opportunity to take social histories, observe mental examinations, and attend conferences with parents presenting children's problems for diagnosis and treatment.

PHILOSOPHY AND PSYCHOLOGY

The subjects of Philosophy and Psychology are grouped in the Susan Linn Sage School of Philosophy. This School owes its existence to the generosity of the late Henry W. Sage, who, in addition to endowing the Susan Linn Sage Philosophical Professorship, made a further gift of $200,000 for the purpose of providing permanently at Cornell University for philosophical instruction and investigation of the most varied kind and of the highest order. The endowments of the School of Philosophy enable it to secure whatever material facilities are required for the successful prosecution of philosophical studies and research. The more important philosophical and psychological journals, American and foreign, are received by the Library, which is also well equipped with philosophical and psychological works, and is particularly rich in literature relating to Plato, Spinoza, and Kant.

The larger part of the work of the Sage School is adapted to the needs of graduates of this and other institutions, who are preparing themselves to be teachers or investigators in philosophy and in allied fields of study. A student who has made a special study of philosophy during his junior and senior years may still take a graduate course of three years' work with history of philosophy, logic and metaphysics, ethics, or psychology, as his major subject. For the encouragement of higher studies and research in every branch represented by the School of Philosophy, there have been established three fellowships of the annual value of $400 each, and six scholarships of the annual value of $200 each. Holders of fellowships and graduate scholarships are also exempt from the payment of tuition. Of these, one fellowship and one scholarship are regularly assigned to psychology. Applicants for fellowships and scholarships should therefore state definitely whether their major subject will be in one of the several branches of philosophy or in psychology.

The School is devoted to the free and unhampered investigation of truth in regard to all those questions of human inquiry which are embraced by logic, metaphysics, psychology, ethics, asethetics, and the history and philosophy of religion. In the courses of instruction are represented the chief branches and problems of philosophy. Work devoted to the thesis for the doctorate is intended to secure the maximum of specialized training and the power of independent inquiry and statement of results. In all divisions of philosophy particular stress is laid upon the historical study of philosophical ideas as the best means of securing a comprehensive grasp of fundamental problems and values.

*Philosophy

Professors Frank Thilly, Philosophy; W. A. Hammond, Ancient and Medieval Philosophy and Aesthetics; Ernest Albee, Philosophy; Harold R. Smart, Philosophy; *Doctor* E. T. Paine, Philosophy.

The philosophical seminary room in the University Library is provided with complete sets of the leading philosophical journals, lexicons, and other books of reference, and the more important works in the several branches of philosophy and psychology. The current numbers of the philosophical journals are also to be found in the room. Liberal provision is made for the constant growth of this special library.

The Philosophical Review, established by the University, is a bi-monthly journal devoted to the interests of philosophy, embracing under that title logic, meta-

physics, ethics, psychology, aesthetics, and philosophy of religion. Although supported by private endowment, it is not the organ of any institution or of any philosophical school, but by the terms of the subsidy is an absolutely free organ of contemporary philosophy.

Under the title of *Cornell Studies in Philosophy*, a series of monograph studies is published from time to time as representative of the work done by graduate students in philosophy. These monographs are issued under the editorial supervision of the professors of philosophy, and consist mainly of studies undertaken originally as dissertations for the doctorate. The series furnishes also a channel for the publication of research other than that of the thesis. Seventeen monographs have been issued in the series.

A full description of the courses given by the Sage School of Philosophy will be found in the Announcement of the College of Arts and Sciences. While any of these courses may be utilized by graduates, attendance at lectures is to be regarded only as an aid to the independent development on the part of the student of critical scholarship and methods of investigation.

HISTORY OF PHILOSOPHY. Professors HAMMOND and THILLY. The history of philosophical speculation from its origin among the Greeks to the present time.

SOCIAL AND POLITICAL ETHICS AND THE PHILOSOPHY OF THE STATE. Professor THILLY. A study of political and legal theories and institutions in their relation to ethics.

IDEALISM: PLATONIC AND MODERN. Assistant Professor SMART. A study in classical and modern thought.

RAPID READING OF PHILOSOPHICAL GERMAN. Professor HAMMOND. For orientation in philosophical terminology in German.

HISTORY OF ANCIENT AND MEDIEVAL ETHICS. Professor HAMMOND. Development of ethical theories among the Greeks, Romans, and Scholastics.

HISTORY OF MODERN ETHICS. Professor ALBEE. The history of modern ethics with special reference to the recognized methods of ethics and with particular attention to British ethics.

THE ETHICS OF MODERN UTILITARIANISM. Professor THILLY. A critical study of the development of modern English utilitarianism as represented by John Stuart Mill, Herbert Spencer, Henry Sidgwick, and G. E. Moore.

MODERN IDEALISTIC THEORIES OF ETHICS. Professor THILLY. A critical study of Kant's Fundamental Principles of the Metaphysics of Ethics and Critique of Practical Reason, and Hegel's Philosophy of Right.

SOURCES OF ANCIENT AND MEDIEVAL PHILOSOPHY. Professor HAMMOND. Critical examination of the primary sources and study of historical problems.

THE REPUBLIC OF PLATO. Professor HAMMOND. Reading of Greek text. This course is intended for students of Greek literature as well as of Greek philosophy.

PROBLEMS IN CONTEMPORARY METAPHYSICS. Assistant Professor SMART.

EMPIRICISM AND RATIONALISM. Professor ALBEE. Lectures and discussions. The empirical movement as represented by Locke, Berkeley, and Hume, and the rationalistic movement as represented especially by Leibniz.

THE CRITICAL PHILOSOPHY OF KANT. Professor ALBEE. Lectures and discussions. A study of the *Critique of Pure Reason* and the *Critique of Judgment*, with frequent references to standard commentaries and to more recent interpretations.

EARLY RATIONALISM: SPINOZA AND LEIBNIZ. Professor ALBEE. A critical study of early Rationalism with special reference to the divergent tendencies represented by Spinoza and Leibniz.

MODERN BRITISH IDEALISM. Professor ALBEE. The lectures will deal mainly with representative works of T. H. Green, Bradley, and Pringle-Pattison.

SEMINARY IN ETHICS. Professor THILLY. Fundamental concepts of Ethics.

SEMINARY IN ANCIENT AND MEDIEVAL PHILOSOPHY. Professor HAMMOND.

SEMINARY IN LOGIC AND METAPHYSICS. Assistant Professor SMART.

SEMINARY IN AESTHETICS. Professor HAMMOND. Historical study of aesthetic theories.

*Psychology

Professors E. B. Titchener, H. P. Weld, K. M. Dallenbach, and L. B. Hoisington; *Mr.* F. L. Bixby; *Doctor* S. Feldman.

The research department of the psychological laboratory in Morrill Hall contains fifteen rooms, two of which are used as the private laboratories of the officers of instruction, one as a seminary room, and one as a workshop; the remainder are at the disposal of students for advanced work. The experimental rooms are furnished, as required, with air, gas, water, and the direct and alternating electric current; they are also connected by an elaborate wiring system, so that two or more rooms may be employed together in a single investigation. There are two dark chambers. The workshop is adequately equipped. The laboratory possesses standard instruments of precision for all the principal modes of experiment in human psychology, and is especially rich on the side of acoustics. Materials are available, or can be supplied, for the study of certain problems in comparative psychology. The equipment is undergoing continual improvement, and special apparatus required for research is at once constructed or procured.

Graduate students further have the use of the unusually complete sets of demonstrational and teaching apparatus contained in the demonstrational laboratory (Goldwin Smith Hall) and the undergraduate laboratory (Morrill Hall).

Graduate study in psychology is informal, and no exclusively graduate courses are given. For the guidance of graduate study Professors Weld, Dallenbach, and Hoisington conduct weekly conferences on subjects which parallel the course in Systematic Psychology,—a course which graduate students are generally advised to take; and Professor Titchener directs a seminary on some psychological topic which is offered by invitation to candidates for the doctor's degree who are adequately prepared. Professor Titchener also confers weekly with candidates for the doctorate in psychology, and Professor Weld holds weekly conferences with students who either are candidates for the master's degree or are pursuing a minor in psychology. For the technical training of the student stress is laid upon observational practice, and candidates for advanced degrees are urged to take part as observers in at least three experimental investigations; so far as possible this observational practice is given in subjects which are remote from their own problems.

No list of prerequisites for graduate work in psychology can be laid down. It is assumed, however, that before a student presents himself for graduate study he will have had a general course in psychology and laboratory courses in qualitative and quantitative psychology. All undergraduate courses of the junior and senior years are conducted by the heuristic method and with reference to original sources, so that any deficiency of preparation on the part of the graduate student can, by attendance upon one or other of these courses, be made up without passing from the atmosphere of research to that of mere information.

Elementary Psychology. Professor Titchener, Assistant Professors Dallenbach and Hoisington, Mr. Bixby and Dr. Feldman.

Experimental Psychology, Qualitative and Quantitative. Professor Weld and Assistant Professors Dallenbach and Hoisington.

Systematic Psychology: Perception and Idea. Professor Weld and Mr. Bixby.

Systematic Psychology: Memory, Imagination, and Thought: Emotion and Volition. Professor Weld and Assistant Professors Dallenbach and Hoisington.

Reading of German Psychology. Professor Weld.

Reading of French Psychology. Professor Weld.

Apparatus and Methods: Technique of the Laboratory. Dr. Feldman.

Psychological Problems, Historical and Experimental. Professor Weld, Assistant Professors Dallenbach and Hoisington, and Mr. Bixby.

Research Laboratory. Professor Titchener.

MATHEMATICS

Professors J. I. HUTCHINSON, VIRGIL SNYDER, F. R. SHARPE, ARTHUR RANUM, W. A. HURWITZ, W. B. CARVER, D. C. GILLESPIE, and C. F. CRAIG; *Messrs.* P. A. FRALEIGH, H. PORITSKY, and J. WOLFENDER.

The graduate work provides instruction in the principal branches of mathematics and furnishes preparation and material for independent investigation. Only a portion of the whole field can be covered by the courses given in a single year. The courses are changed, therefore, from year to year in order to meet the needs of students.

In addition to the regular instruction, individual guidance and advice are offered to any student who wishes to follow a particular line of inquiry.

Students who take mathematics as a major subject for an advanced degree must have completed previously the equivalent of the elementary course in analytic geometry and calculus, and further study in at least one more advanced subject, as for example, differential equations, advanced calculus, modern algebra, or projective or advanced analytic geometry.

The Oliver Mathematical Club, composed of teachers and advanced students, meets weekly, and has for its object the systematic presentation by the members of some specified mathematical theory of recent development, and of reports on noteworthy articles in current journals and on results of special reading and investigations.

The equipment consists of a collection of about three hundred surfaces, including the various forms of the cyclides, the Kummer surface, the surface of centers, and minimum surfaces; plaster models illustrating positive, negative, and parabolic curvature, and constant measure of curvature; plaster models illustrating the theory of functions, among them models of simply and multiply connected surfaces, and of several forms of Riemann's surfaces, and models representing the real parts of algebraic, exponential, logarithmic, and elliptic functions; wooden and glass models of crystals and polyhedra, wire and thread models of twisted curves and ruled surfaces, and skeleton frames for minimum surfaces.

The University Library has a large collection of books on pure and applied mathematics, including collected works of mathematicians, complete sets of all the important mathematical journals, transactions and other publications of scientific societies, and doctoral theses from the leading American and European universities.

The following courses are offered. The courses mentioned only by title will not be given in 1926–27, but are usually given at intervals of two or three years.

*ALGEBRA

THEORY OF EQUATIONS. Professor SHARPE. Prerequisite, Elementary Calculus. Algebraic equations, determinants, eliminations, linear transformations, invariants and covariants, elementary divisors.

[THEORY OF NUMBERS. Not given in 1926–27.]

[THEORY OF GROUPS. Not given in 1926–27.]

*ANALYSIS

ELEMENTARY DIFFERENTIAL EQUATIONS. Professor CRAIG. Repeated second term. Prerequisite, Elementary Calculus.

ADVANCED CALCULUS. Professor OWENS and Mr. FRALEIGH. Prerequisite, Elementary Calculus. The processes of the Calculus, their meanings and applications.

THEORY OF DIFFERENTIAL EQUATIONS. Mr. WOLFENDER. Prerequisite, Elementary Differential Equations. Existence theorems for linear differential equations. Partial differential equations. Applications to geometry and physics.

LINEAR EQUATIONS IN AN INFINITE NUMBER OF VARIABLES. Professor GILLESPIE. Prerequisite, Advanced Calculus. Assigned reading and reports on the origin of the problem. Methods of solution and applications of results.

THEORY OF FUNCTIONS OF A REAL VARIABLE. Professor HURWITZ. Prerequisite, Advanced Calculus. The number system. Point sets. Transfinite

numbers. Generalizations of the properties of continuity, differentiation, integration, and summation.

THEORY OF ENTIRE FUNCTIONS. Professor HUTCHINSON. Prerequisite, Advanced Calculus. Elementary properties of entire functions of finite genus. Applications to well known functions.

[THEORY OF FUNCTIONS OF A COMPLEX VARIABLE. Not given in 1926–27.]

[INTEGRAL EQUATIONS. Not given in 1926–27.]

[INFINITE SERIES. Not given in 1926–27.]

[CALCULUS OF VARIATIONS. Not given in 1926–27.]

*GEOMETRY

PROJECTIVE GEOMETRY. Professor CARVER. Prerequisite, Elementary Calculus. The elements of projective geometry treated synthetically.

ADVANCED ANALYTIC GEOMETRY. Professor RANUM. Prerequisite, Elementary Calculus. An introduction to modern methods including the use of homogeneous coordinates and of tetracyclic and pentaspherical coordinates.

ALGEBRAIC SURFACES. Professor SNYDER. Prerequisite, Advanced Analytic Geometry. Rational surfaces, plane representation. Geometry on algebraic surfaces by the methods of the modern Italian school.

[ALGEBRAIC CURVES. Not given in 1926–27.]

[GEOMETRY OF HYPERSPACE. Not given in 1926–27.]

[DIFFERENTIAL GEOMETRY. Not given in 1926–27.]

[LINE GEOMETRY. Not given in 1926–27.]

[NON EUCLIDIAN GEOMETRY. Not given in 1926–27.]

*APPLIED MATHEMATICS

THEORY OF PROBABILITIES. Professor HURWITZ. The theory with applications to statistics, theory of errors, correlation, insurance.

POTENTIAL THEORY. Mr. PORITSKY. First term. Prerequisite, Elementary Calculus. Newtonian and logarithmic potentials with applications to gravitation and electromagnetism. Dirichlet's Problem. Conformal mapping.

FOURIER'S SERIES AND INTEGRALS. Mr. PORITSKY. Second term. Prerequisite, Elementary Calculus. Expansion of functions in Fourier and allied series and integrals. Applications to the quantum theory. Harmonic Analysis.

[DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS. Not given in 1926–27.]

[VECTOR ANALYSIS. Not given in 1926–27.]

[HYDRODYNAMICS AND ELASTICITY. Not given in 1926–27.]

THE ENGINEERING SCIENCES

Graduate work in Engineering will be limited presumably to one field. This may be chosen in any one of the three larger subdivisions or schools of Engineering, i. e., Civil, Mechanical, or Electrical, although further subdivision will always be required. It is, however, always possible to elect work and to pursue research in two or more schools, provided one *field* only is involved, as, for example, in hydro-electric power or in hydro-electric traction.

For better teaching facilities, some duplication exists, both in subject matter and in equipment, and a student should therefore select in such a case the school naturally making the same applications that he himself desires to make. For example, in the School of Mechanical Engineering, hydraulics naturally leads towards, and is developed with a view to, pump design or hydraulic power plants. In Civil Engineering, on the other hand, hydraulics looks forward to water power installations, to canal and harbor construction, to sewerage and waterworks.

In some cases, as for example in studies on cement or steel specifications, further training in chemistry might be found imperative, though that might involve work in still another school. Such additional study is desirable, sometimes essential for successful pursuit of many kinds of graduate work in Engineering. It is particularly desirable that a thorough knowledge of all fundamental theory be in hand before any attempt is made to carry out its applications into Engineering Design or Construction.

*Mechanics

In Civil Engineering

Professors S. G. George, E. W. Rettger and E. V. Howell.

An extensive departmental library in Lincoln Hall, in addition to the University Library, affords facilities for advanced work in the field of applied mechanics, especially in applications such as occur in structural engineering.

The prerequisite training for graduate work in this subject should cover the fundamental principles and applications in mathematics, physics, materials, mechanics and structural design required for graduation in civil engineering at Cornell University. Many of the advanced treatises are in French or German, and an ability to read technical works in these languages is extremely valuable.

Advanced Mechanics. Linear arches; curved beams; special cases of flexure; problems in the mathematical theory of elasticity; thick hollow cylinders and spheres; plates variously supported; Castigliano's theorem of least work with extensive applications to deflections, beams, arches, and statically indeterminate cases of trusses, beams, frames, and arches.

Special Research and Seminar Courses in Advanced Mechanics. Topics and Methods of Investigation, individually arranged.

*Materials of Construction

Professor H. H. Scofield.

The library of the School of Civil Engineering is well supplied with reference works of various kinds on the subject of structural materials, their properties, specifications, and tests. Especial effort is made to add continually the most recent investigations and researches as the results find their way into print.

The equipment is selected to make all ordinary and many special tests and investigations of the materials of construction. The testing machines range in capacities from 400,000 pounds in tension, compression, and flexure on long span beams, to 1,000 pounds. The tests of toughness, abrasion, and wear may be made upon rock, paving brick, and similar materials. Core drills, diamond saws, lap grinders, and other apparatus for the proper preparation of these test pieces are available.

The cement and concrete laboratories are equipped to make all the standard tests upon cement and the various other ingredients entering into concrete. A specialty is made in the tests and investigations of the finished concrete under various conditions as to proportion, manufacture, and design.

Materials Laboratory. Professor Scofield. Open to graduates who lack fundamental laboratory experience.

Engineering Research in Materials. Professor Scofield. Special investigations of an advanced nature of the properties of structural units and the materials of construction. Proper investigational methods are insisted on so that the results shall be of the caliber and scope deemed essential for publication.

Hydraulics and Hydraulic Engineering

In Civil Engineering

Major work in Experimental Hydraulics, Theoretical Hydraulics, or Hydraulic Engineering may consist in part (subject to the thesis requirement) of advanced courses selected from the subjoined list, or the entire minor work may consist of such courses accompanied by such special work and reports as may be arranged with the faculty members of the special committee.

A candidate for the degree of Master of Civil Engineering (or of Science), or Doctor of Philosophy who desires to take either a major or a minor subject in these fields of study must ordinarily have completed, preliminary to graduate work, courses in Hydraulics, Municipal Sanitation (including sewer design and construction and sewage disposal), and Water Supply, substantially equivalent to these courses as required of all undergraduates in the School of Civil Engineering. If a graduate student lacks one or more of these preliminary courses or

considerable portions of any of them, more than the minimum period of residence may be necessary.

Ordinarily for major work in Hydraulic Engineering the thesis requirement of the Graduate School must be satisfied by work involving original designs, estimates, or analyses based on actual engineering data, these to be gathered by the student himself as an essential part of advanced work in this field, and the requirement may not be satisfied by the so-called descriptive type of thesis with only rather vague design based on assumed data.

For major work in Experimental (or Theoretical) Hydraulics the thesis requirement may be satisfied by individual experimental (or theoretical) investigation and a thesis based thereon. The department can usually suggest interesting subjects for investigation on some of the numerous topics of hydraulics on which scientific information is both needed and demanded by the engineering profession. Ordinarily fully half of the student's total time should be devoted to the thesis investigation. The tendency is to underestimate the time required for preliminary work and that necessary for a thorough digestion of results in preparation of the thesis. Consequently the work should be begun, if possible, early in the first term of residence.

*HYDRAULICS

Professor E. W. SCHODER.

The unique situation and construction of the Hydraulic Laboratory render practicable investigations requiring a steady gravity water supply for long periods using relatively large flows of water. The water supply is obtained from Fall Creek with a watershed of 126 square miles. Beebe Lake, a pond of about 20 acres, has been formed by the construction of a concrete dam, 26 feet high, with a spillway crest length of 130.5 feet. At one end of the dam there is an additional flood spillway 141.5 feet long. A rectangular canal 420 feet long and 16 feet wide is supplied from Beebe Lake through six headgates for controlling the amount of flow. The upper portion of the canal is 17.7 feet deep and the lower portion is 10 feet deep. In this canal are two sharp crested weirs, 16 feet long, over which discharges as large as 400 cubic feet a second may be passed.

A short branch canal 6 feet wide, in the upper portion of the laboratory building, may be supplied directly from Beebe Lake by means of a 48-inch steel pipe line with a short 30-inch branch at its lower end. A 30-inch valve controls the flow from the 48-inch pipe into the 6-foot canal. The 6-foot canal discharges either to waste into the pool below Triphammer Falls (a sheer drop of 60 feet) or into the upper end of a steel standpipe 6 feet in diameter and 60 feet high. A suitable mechanism causes an instantaneous diversion of discharges as large as 60 cubic feet a second from the waste flume into the standpipe or vice versa. The 6-foot standpipe is provided at the bottom with a 36-inch discharge valve operated by hydraulic pressure. There is a float guage indicating accurately the height of the water surface in the standpipe. An independent 10-inch pipe line from Beebe Lake to the bottom of the laboratory supplies the majority of the pieces of apparatus used for class work and research. The 6-foot standpipe may be used also as a supply tank, water being supplied to it either from the 6-foot canal or the 10-inch pipe line.

The lower portion of the large 16-foot canal, 350 feet long between weirs, is used for measurements with floats and current meters. An electrically operated car spans this canal and is used for rating the current meters. Models of dams may be built in the canal and the flow over them investigated with precision. Outdoors there are also twin flumes 2 feet wide, 2½ feet deep, and 90 feet long, extending downstream from a short canal 7 feet wide and 3 feet deep just below Beebe Dam to a 2,000-cubic-foot concrete measuring tank. The water supply to these flumes is independent of the large canal or of the 48-inch pipe. Outside work is usually impracticable between December 1 and April 1.

In the laboratory building there is also a concrete flume 2 feet wide, 4 feet deep, and 25 feet long. Flows up to 11 cubic feet a second can be passed through this and measured volumetrically. This flume is conveniently arranged for experiments on small weirs, low head orifices, etc.

There are numerous flanged connections from 4 to 24 inches diameter for the attachment of apparatus.

The hydraulic machinery equipment at present includes only types of the turbine, Pelton-Doble wheel, overshot wheel, multi-stage centrifugal pump and hydraulic ram, all arranged for testing.

Prospective graduate students should bear in mind that only under very rare circumstances can a candidate for the Master's degree, or even the Doctor's degree, hope to carry out an experimental investigation in hydraulics involving large flows of water up to the capacity of the laboratory or involving extensive constructions. The limitations of seasonal availability of water and of weather conditions, as well as of time, labor, and expense, are such that the graduate student in this subject should look forward to investigations of lesser apparent magnitude, but often of equal value.

ADVANCED HYDRAULICS. One recitation and two long periods a week. One period is devoted to problems and the other to laboratory work and preparation of reports. The recitations and problems take up topics in stability of flotation; overflow dams, free and submerged; backwater and variable flow in open channels; standing waves; water hammer and surges; flow of air in pipes; impulse wheels and turbines; centrifugal pumps; hydraulic rams; logarithmic plotting. The laboratory experiments include gage testing, orifices, nozzles, pipes, current meter reading, Pitot tube, Venturi meter.

HYDRAULIC MEASUREMENTS. In addition to more thorough experimental investigations on some of the laboratory topics mentioned under course 41, e. g., weirs, Pitot tubes, pipes and current meters, the work includes fire hose and nozzles, ordinary water meters, floats in open channels, actual measurement of river discharge (on a week-end trip) and such occasional tests as opportunity offers in the laboratory or the immediate neighborhood of Ithaca.

EXPERIMENTAL HYDRAULIC MOTORS AND PUMPS. The determination of efficiency, capacity, and characteristics of hydraulic machinery by tests.

EXPERIMENTAL HYDRAULIC INVESTIGATION. The subject and scope of the investigation should be selected by conference at the beginning of the term if not previously arranged. It is often permissible and desirable for two students to work together on the same investigation. Written reports are required but the text need not be typewritten in thesis style; these reports are kept by the department. In most cases it is necessary to arrange a definite schedule for work in the laboratory to avoid conflicts.

*HYDRAULIC ENGINEERING

In Civil Engineering

Professor F. J. SEERY.

HYDRAULIC CONSTRUCTION. The course is devoted largely to a study of water storage and the engineering investigations and design of structures associated with stream regulation for public water supplies, water power, irrigation or navigation. Extensive problems are worked out involving the preliminary investigation of a project, exploration of dam sites, surveys of reservoir sites, the economics of storage, manipulation of storage and pondage, the preparation of an estimate of quantities, costs, plan of progress in construction, etc., for a particular project. The stability of weir dams by graphics, and the analytic design of high masonry dams by Wegmann's method, together with a study of all the factors affecting the stability and form of section of a dam, and the methods of construction are fully covered by text and in problems. Earthen dams and embankments, timber weirs, movable dams, and flashboards are also considered.

WATER-POWER ENGINEERING. Recitations from assigned text and the working of lengthy problems. The course is devoted to a general study of the problems of water power development, the factors affecting the economics of a project, the engineering and commerical feasibility of developing power and the value of a mill site. A detailed study of the characteristics of modern turbine types, the selection of mechanical equipment suited to the conditions of installation and operation, the effects of load factors, pondage, storage and steam auxiliary on the capacity

and cost; together with an analysis of the power capacity of a low head mill site, the speed regulation of a plant under medium head fed by a long penstock, and a thorough study of the phenomena of unsteady flow and surging, with and without surge tanks, are covered by the text and incorporated into numerical problems taken from existing plants.

In Mechanical Engineering

Professor F. G. SWITZER.

Arrangements can sometimes be made for experimental work in the University hydro-electric plant. This plant contains a reaction turbine built by the I. P. Morris Department of the Wm. Cramp and Sons Ship and Engine Building Co., rated at 550 h.p., 600 r.p.m. at 142 ft. head. There are also four impulse turbines of the Pelton-Doble type, two of which are rated at 280 h.p., 124 r.p.m. at 135 ft. head, and the other two are rated at 50 h.p., 300 r.p.m. at 135 ft. head. The three large machines are directly connected to 60-cycle alternaters; the two smaller machines are directly connected to d.c. generators. There is also a separate d.c. generator driven by a synchronous motor and the usual switchboard and control apparatus.

The libraries of the University have a very complete collection of treatises relating to mechanics, hydraulics, hydro-electric engineering, and to similar subjects. In addition, these libraries contain the more representative engineering periodicals and the transactions of the leading engineering societies of the world.

HYDRAULIC POWER PLANTS. Professor SWITZER. A brief survey of the problem of the consulting engineer in waterpower work with a more detailed study of power houses and their equipment. Considerable emphasis is placed upon the financial problems of construction and operation of the water power plant, alone, and as part of a large power system.

HYDRAULIC POWER PLANT DESIGN. Professor SWITZER. Applications of the work given in the preceding course to the investigation of problems of design of parts or the whole of a water power plant. Problems will be chosen to meet the needs of each student.

*MACHINE DESIGN

Professors C. D. ALBERT, E. F. GARNER, F. S. ROGERS, and C. E. TOWNSEND.

Under this head is included advanced instruction in descriptive geometry, kinematics, machine design and design methods, and special design problems.

There are nine well equipped drawing rooms. The Sibley Library and the University Library have a very complete collection of books on drawing, machine design and construction, structural design, and books on related subjects.

*HIGHWAY ENGINEERING

Professors W. L. CONWELL and J. E. PERRY.

The laboratory for testing rocks, aggregates, and other non-bituminous highway materials is in the basement of Lincoln Hall. It is equipped with a Deval machine, Page impact machine for the toughness test, impact machine for the cementation test, ball mill, core drill, rock saw, grinding lap, Dorry machine, briquette molding machine, rattler for testing paving brick, sieves, etc.

The laboratory for testing bituminous highway materials and subgrade soils is housed in a separate building. This laboratory is equipped with facilities for making the standard tests of specific gravity, consistency, ductility, distillation, evaporation, flash and burning points, fixed carbon, melting point, etc., on bituminous materials and also with apparatus for testing subsoils for volumetric change, moisture equivalent, bearing value, capillarity, water capacity, mechanical analysis, etc.

The other laboratories of the School of Civil Engineering equipped for the purpose of investigating the properties of engineering materials and the Ceramic Laboratory of the Department of Geology, which is equipped with kilns and a brick machine, are also available for students specializing in highway engineering.

The Library of the School of Civil Engineering and the University Library contain a comprehensive collection of books on highway engineering, periodicals, publications of technical societies, while the office of the Department of Highway Engineering has on file city and state specifications and reports, government bulletins and reports, reports on highway engineering research, standard plans and plans of highway projects, and catalogues of equipment, all of which are available to students.

HIGHWAY ENGINEERING. This course will not be accepted as part of a major or minor subject in graduate work.

ADVANCED HIGHWAY ENGINEERING. Study of research data, economics of location, design of highways, contractor's organizations, etc.

HIGHWAY LABORATORY. Standard tests of bituminous and non-bituminous materials, and subgrade soils and tests of paving mixtures.

ADVANCED HIGHWAY LABORATORY. Investigation of special problems in the field of highway research.

HIGHWAY ENGINEERING DESIGN. Design of highways, highway structures, estimates of cost, etc.

HIGHWAY ENGINEERING RESEARCH. Laboratory investigations and collection and analysis of data referring to the field of highway economics.

In the fall of the year trips are made from time to time to investigate the actual condition of roads and various phases of highway work; in the spring numerous field inspections are made of drainage and subsoil conditions; later, when work on highway contracts begins, particular attention is paid to contractor's equipment and organization.

Note. For the larger highway structures, see *STRUCTURAL ENGINEERING.*

*RAILROAD ENGINEERING

Professors F. A. BARNES, J. E. PERRY, and CARL CRANDALL.

The library of the School of Civil Engineering contains an excellent and up-to-date collection of books, periodicals, and publications of railway and other technical societies on the location, construction, maintenance, and operation of railways and on transportation. Specifications, standard plans, and maps and profiles are available for use in the study of economics of location, railway structures, signaling, yard and terminal design, etc. Instrumental equipment is available for securing additional data for special problems in relocation and in design of structures.

The following elective courses supplemented by problems as required, may be taken as part of a major or minor subject by those who may not have covered such work in their undergraduate courses:

MAINTENANCE OF WAY and STRUCTURES. Assistant Professor PERRY.

OPERATION AND MANAGEMENT. Assistant Professor PERRY.

ENGINEERING DESIGN. Professor BARNES and Assistant Professor CRANDALL.

ENGINEERING RESEARCH. Professor BARNES.

The first two consists of recitations and lectures; the latter two involve individual work on special problems or investigations. The field is so broad that the interest of the student is considered in the assignment of work.

In addition to the above courses, the student may take courses in other departments if time permits; such as courses in transportation in the College of Arts and Sciences, or in the applications of electricity to railway work in the School of Electrical Engineering.

Note. For the larger railway structures, see *STRUCTURAL ENGINEERING.*

*SANITARY ENGINEERING

Professors H. N. OGDEN and C. L. WALKER.

The courses offered to graduate students may be divided into two classes: those dealing with the design, construction, and operation of sewage-disposal plants and water purification plants; and those fundamental studies in chemistry, biology, and bacteriology, which the undergraduate student in civil engineering may not have been able to pursue.

A sewage-disposal plant in the city of Ithaca offers opportunity for experimental study of septic action and of sedimentation. Within a short distance from Ithaca are five other plants, well adapted for critical examinations of efficiencies. Numerous other opportunities are offered for the study of similar questions.

The laboratories in all the related subjects are open to graduate students in sanitary engineering. The courses in organic chemistry are well adapted to the study of the disposal of trade wastes. The courses in mycology and botany afford excellent opportunity for studying the life history of algae and other water plants which affect both stream pollution and purification. The courses in bacteriology deal not only with water bacteria and the colon types but also with pathogenic forms interesting from the point of view of epidemiology. The courses in the Medical College enable the student to trace the effect of the pollutions of water supply and to acquire a working knowledge of the water-borne diseases. Finally, a well-equipped sanitary laboratory established in the College gives an opportunity for students to acquire not merely laboratory technique in water analysis, but also a practical training in the forms of interpretation. This laboratory is also available for experimental studies of the efficiency of water and sewage plants and of methods of dealing with the refuse from factories. The library is well provided with the literature of the various subjects bearing on municipal sanitation.

The following courses in other subjects in the University may profitably be taken by graduate students in sanitary engineering: Economics 76; Government and Public Law 4; Chemistry 305; Chemistry 615; Botany 12; Entomology 30; Veterinary College, course 43.

In order to take advanced work in this department, the student must have had an equivalent of the following preliminary courses described in the Announcement of the College of Engineering:

Sanitary Biology; Municipal Engineering; Purification and Control of Water Supplies; Sewerage Works; Sanitary Laboratory.

Primarily for Graduates

PURIFICATION OF WATER. Professor OGDEN. Specific problems in water purification; control of watersheds; effect of sedimentation on waters of different compositions; treatment of waters for particular requirements, such as removal of hardness, sediment, bacteria, etc. A report on some existing water system will be required from each student.

CONFERENCE ON PRESENT METHODS OF SEWAGE DISPOSAL. Professor OGDEN. A critical study of the construction and operation of plants now in existence. Inspections and reports.

LABORATORY COURSE. Professors OGDEN and WALKER. Devoted to some special problem of sewage or water, such as the operation of a water-filtration plant, a sewage-disposal plant, the purification of trade wastes, the value of disinfection, etc.

*HEAT-POWER ENGINEERING

Professors W. N. BARNARD, F. O. ELLENWOOD, M. C. ERNSBERGER, R. E. CLARK, F. C. EVANS, and W. H. HOOK.

The graduate work conducted under this heading includes original investigations in engineering thermodynamics, problems in power plant economics, the selection and arrangement of the equipment of power plants and the design of such equipment. The library is liberally provided with reference books, periodical literature, and transactions of engineering societies relating to these subjects.

As prerequisites for the graduate work in this field the student should have had the equivalent of the fundamental courses in machine design, experimental engineering, and heat-power engineering that are required of undergraduates in mechanical engineering. These courses are described in the Announcement of the College of Engineering. Those lacking the full equivalent of this training may be required to take one or more of these undergraduate courses or to do specially assigned work to make up the deficiency.

The following courses, which are described in the Announcement of the College of Engineering, are open to both undergraduate and graduate students:

HEAT-POWER ENGINEERING. Mainly Thermodynamics. Professor ELLENWOOD.

HEAT-POWER ENGINEERING. Chiefly Plant Equipment. Professor ERNSBERGER.

STEAM POWER PLANTS. Professor BARNARD.

INTERNAL COMBUSTION ENGINES. Assistant Professor CLARK.

STEAM TURBINES. Assistant Professor CLARK.

STEAM BOILERS AND BOILER PLANTS. Assistant Professor HOOK.

PUMPING AND PNEUMATIC MACHINERY. Professor ELLENWOOD.

REFRIGERATION. Professor ERNSBERGER.

GRAPHICAL COMPUTATION AND REPRESENTATION. Assistant Professor EVANS.

DESIGN AND SPECIAL PROBLEMS IN HEAT-POWER ENGINEERING. Professors BARNARD, ELLENWOOD, and ERNSBERGER.

*STRUCTURAL ENGINEERING

Professors L. C. URQUHART, E. N. BURROWS, and C. E. O'ROURKE.

In this subject instruction is offered in the determination of loading and stresses and the design of roofs, buildings, bridges, arches, foundations, piers, retaining walls, and other structures of timber, steel, and concrete.

A collection of detail plans of American structures is available, together with a large number of photographs of bridges and buildings.

The library contains practically all the important books on bridge and structural engineering. It also contains a valuable collection of theses, those on original investigations relating to arch bridges and secondary stresses being especially noteworthy. These investigations have been conducted so as to form an extended and closely related series. Their results constitute an important addition to previous knowledge of the relative strength, stiffness, and weight of different types of construction and of the method for their investigation and design. Special facilities are available for the study of secondary stresses in bridge trusses.

To qualify for graduate work in structural engineering, a knowledge of theoretical mechanics, of strength of materials, of engineering construction, and elementary courses in stresses and design in timber, steel, and concrete are required.

The following regularly scheduled courses are open only to seniors and graduates but satisfactory work in any of them will not be considered as completing the requirements of a minor, and further study in some related field is expected.

HIGHER STRUCTURES. Professor URQUHART. The theory of two- and three-hinged arches and of continuous beams and bridges. (Required of all graduate students whose major or minor is in Structural Engineering.)

STEEL BUILDINGS. Assistant Professor BURROWS. Design of a typical modern mill building.

BRIDGE DESIGN. Assistant Professor BURROWS. Design of a modern railroad or highway bridge of moderate span.

INVESTIGATION OF EXISTING BRIDGES. Assistant Professor BURROWS. Examination of and stress analysis of some of the local bridges.

MASONRY AND FOUNDATIONS. Assistant Professor O'ROURKE. A study of the various types of foundations for bridges and buildings, including piled foundations, caissons, and cofferdams.

CONCRETE DESIGN. Professor URQUHART and Assistant Professor O'ROURKE. Design of a modern reinforced concrete building.

REINFORCED CONCRETE ARCH. Professor URQUHART. Design of a railroad or highway reinforced concrete arch bridge.

CONCRETE HIGHWAY BRIDGE DESIGN. Professor URQUHART. Design of retaining walls, short span concrete bridges, and abutments.

ENGINEERING DESIGN. Professor URQUHART and Assistant Professors BURROWS and O'ROURKE. Special problems of design or investigation not covered in the above courses.

*Experimental Engineering and Mechanical Engineering Research

Professors H. Diederichs, W. M. Sawdon, G. B. Upton, V. R. Gage, and A. C. Davis.

The Materials Testing Laboratory. This laboratory is equipped for tension and compression tests with an Olsen 300,000-lb. machine, a Riehle 100,000-lb. machine, a 200,000-lb. Emery hydraulic machine, an Olsen 150,000-lb. three-screw machine, a Charpy-Izod impact testing machine, together with several other machines varying in capacity from 10,000 to 100,000 pounds. For transverse test there is a Riehlé machine of 200,000 pounds capacity and a Fairbanks machine of 10,000 pounds capacity. There are one Thurston autographic torsion machine, one Olsen torsion machine of 200,000 inch-pounds capacity, and two Upton-Lewis fatigue testing machines. The equipment includes extensometers, a cathetometer, gas furnaces, tempering baths, and all other apparatus required for the determination of the physical qualities of engineering materials under tensile, compressive, transverse, and torsional stress, and under different kinds of heat treatment.

The Steam Laboratory. In this laboratory there is a 150-HP triple expansion Allis-Corliss engine so fitted up that it may be operated as a simple, compound or triple expansion engine, condensing or non-condensing. There are also several smaller engines, including a Fitchburg Uni-flow, a Russel, a Harris-Corliss, a Payne, and a Troy steam engine. There are three surface condensers and one jet condenser which may be connected with these engines as desired. There are two 35-kw. horizontal Curtis turbines and a 15-kw. De Laval turbine which drive electric generators and may be run condensing or non-condensing, and a Lee turbine direct connected to a Gould centrifugal pump. A two-stage Worthington air compressor driven by a Uni-flow engine and one airbrake pump, together with meters, nozzles, and other instruments, may be used for routine tests. This part of the laboratory also has several fans that can be arranged and equipped for testing. The apparatus and instruments used for engine testing comprise about eighty indicators of different types, about seventy-five steam gauges, a number of calorimeters for determination of the quality of steam, speed counters, tachometers, planimeters, etc., besides a number of dynamometers of various kinds. The boiler section of this laboratory has one 150-HP Babcock and Wilcox water-tube boiler of the marine type, one 100-HP Babcock and Wilcox water-tube boiler of the standard type both of which are fitted with internal superheaters, and an 80-HP Heine water-tube boiler. The auxiliary apparatus consists of a Cochrane open heater, a Wainwright closed heater, a Wayne water softener, a Hayes CO_2 recorder, steam pumps, traps, injectors, etc. A full set of scales, measuring tanks, gauges, flue gas apparatus, separating and throttling calorimeters, pyrometers, etc., complete the boiler equipment.

The Gas Engine Laboratory. The equipment in this laboratory is chosen with a view to providing a great variety of types as to fuel used, governing, etc. It includes an 8-HP Fairbanks gasoline engine, an 8-HP Olds gasoline engine, a 6-HP Ingeco oil engine, a 6-HP and a 15-HP Hornsby-Akroyd oil engine, a 30-HP Westinghouse gas engine with gas producer, a 25-kw. General Electric Co. gas motor set, and a 45-HP Diesel engine. High speed engines are represented by a variety of auto and airplane engines. The testing equipment includes a full set of indicators and a Midgley indicator. Dynamometers are represented by a 150-HP Sprague Electric, a 60-HP Diehl Electric, and two Wheeler hydraulic good for 100-HP at 4000 r.p.m.

The Hydraulic Laboratory. This laboratory contains the following machines and apparatus: a 6-inch single-stage De Laval centrifugal pump; a 2½-inch two-stage Worthington centrifugal pump; a 12-inch Doble water wheel; a 10-inch Trump turbine; several Pelton wheels and hydraulic rams; sets of weir boxes with various types of weirs and nozzles for the determination of coefficients of discharge; various types of water meters and other apparatus for measuring the flow of water, such as Pitot tubes, Venturi meters, current meters, etc.

THE OIL TESTING LABORATORY. This laboratory contains a Cornell oil-testing machine, and a Thurston standard railway-testing machine. The rest of the equipment consists of several viscosimeters of different types, flash and burning test apparatus, together with the necessary hydrometers and thermometers.

THE REFRIGERATION LABORATORY. For the study of refrigeration the mechanical laboratory possesses a 2-ton York absorption machine and a very complete York refrigerating compression plant having a capacity of 15 tons of ice.

THE CEMENT LABORATORY. This laboratory not only contains the ordinary apparatus for the testing of cement and concrete, but in addition is equipped with crushing and grinding machinery and a small vertical kiln for making investigations on the manufacture of cement from raw material.

THE FUEL TESTING LABORATORY. This laboratory contains a complete equipment of fuel calorimeters and other apparatus needed for the determination of the composition and calorific value of fuel, whether gaseous, liquid, or solid.

For the major work in this department the graduate student is required to select a subject in the field of mechanical engineering research. This work is in charge of officers of instruction who devote practically their entire time to it and give advice and assistance to graduate students who are carrying on investigations in the various branches of mechanical engineering. Much of the work in this subject is conducted in the several laboratories described under Experimental Engineering. The equipment and resources of all other departments of the Sibley School are likewise available, and in most instances arrangements can be made to use the equipment of the scientific and engineering departments of the other colleges of the University.

In addition to the well-equipped Sibley library containing reference books, periodical literature, bulletins and transactions of bureaus and societies, relating to mechanical engineering and allied branches of learning, the graduate student has access to the University Library and to the special libraries of the other engineering and scientific departments of the University. In the University Library is a large collection of research theses, and the Department of Engineering Research has on file the results of many investigations.

As minor subjects the department offers the following courses open to both graduate and undergraduate students:

MECHANICAL LABORATORY—EXPERIMENTAL ENGINEERING. First term. Efficiency tests of gas and gasoline engines, steam injectors, steam turbine, blowing fan, hydraulic turbine, and centrifugal pump. Reports are required to be full and complete; and to include data and results of each test under consideration, and all information necessary to understand completely the machine tested and the methods used.

MECHANICAL LABORATORY—EXPERIMENTAL ENGINEERING. Second term. A written report is required on each experiment. Detailed study of methods of testing and methods of computation in the following subjects: testing of engines and boilers, air compressors, ice machines; measurement of flow of water, etc.

MOTOR CAR CONSTRUCTION. Professor UPTON.

HEATING AND VENTILATING. Professor SAWDON. The methods of design and of construction of various forms of ventilating and heating apparatus.

APPLIED METALLOGRAPHY. Professor UPTON. Covers in historical sequence the development of knowledge of the internal structure of metals, and the relation of structure and properties; the technique of metallographic research, study of application of the laws of physical chemistry to interpretation and correlation of results. Study of stable and metastable conditions; heat treatment theory and practice. The practical aim of metallography is constantly emphasized.

*ELECTRICAL ENGINEERING

Professors P. M. LINCOLN, V. KARAPETOFF, J. G. PERTSCH, W. C. BALLARD, R. F. CHAMBERLAIN, and G. F. BASON.

THE LECTURE EQUIPMENT. The lecture room is exceptionally well provided with display apparatus and with apparatus especially designed for demonstration purposes. All types of electrical machinery may be operated on the lecture table, and a 60,000-volt transformer is provided for insulator testing.

THE ELECTRICAL LABORATORY. This laboratory is provided with a great variety of standard and special machines for both direct and alternating-current work, along with the necessary meters and control equipment. Among the special pieces of equipment are a street-car truck with motors and also a complete outfit for exhibiting in actual operation the multiple-unit system of electric car control.

The laboratory has been provided with a large number of new machines, including an alternating-current generator which may be connected as a two-phase, three-phase, or six-phase, machine; a modern synchronous converter provided with brush lifting device; a squirrel-cage and phase-wound induction motor; a sine-wave generating set; also a constant-current transformer and a high-voltage testing transformer with a kenotron tube from which 100,000 volts d.c. may be obtained.

THE STANDARDIZING LABORATORY. This laboratory is equipped with the necessary potentiometers, galvanometers and standards for the calibration of instruments, and the testing of materials used in electrical work. There is also a G. E. oscillograph for work on wave form.

THE COMMUNICATION LABORATORY. This laboratory is provided with representative telegraph and telephone equipment including a complete machine-switching exchange. The radio section includes several transmitters and a number of tube sets operating as telephone and telegraph transmitters. For work with receiving circuits, an assortment of condensers and inductance coils are available in addition to the usual receiving apparatus. Precision measurements are made possible by primary standards of inductance, capacity, and wave length.

Special facilities are provided for research in connection with electron tubes; complete equipment for the manufacture and exhaustion of the same, including condensation pumps, is provided.

ALEXANDER GRAY MEMORIAL LIBRARY. The new library of the School of Electrical Engineering in Franklin Hall has recently been made ready for the use of students and Faculty, in addition to the facilities of the main University Library.

THE UNIVERSITY POWER PLANT. The power for the various laboratories is obtained from the University Hydro-electric Plant, which contains large three-phase alternators, direct-driven by both impulse and reaction water-wheels. This plant is complete in every respect and is used for inspection.

A GRADUATE student working for the M. E. E. degree is expected to possess a knowledge of electrical theory and laboratory substantially equivalent to that required for the degree of E.E. at Cornell University. Graduates of other institutions with somewhat lesser preparation can, however, be admitted to the Graduate School for a term or two as "non-candidates," to take some of the fundamental senior courses and to demonstrate their fitness for graduate work.

A considerable amount of advanced theoretical investigations by the members of the faculty is going on at all times, the subjects studied in the past having been: the general properties of electric, magnetic, and electrostatic circuits, theory of machinery and lines, dielectrics, electron theory, relativity, electric waves, etc. Graduate students are not only invited but expected to participate in these researches. Some of the above topics are taken up in the courses mentioned below, especially in the Seminar and in Engineering Mathematics.

Students intending to do experimental research will be given all the available resources and assistance by the faculty and by the college mechanicians. Resources of the other departments of the University are also available when needed. Those intending to study a special topic or phenomenon are advised to communicate with the Director in advance, in order that they may know what facilities are available along those particular lines.

THEORY OF ELECTRICAL MACHINERY. Professor KARAPETOFF.
CHARACTERISTICS OF ELECTRICAL MACHINERY. Professor KARAPETOFF.
FUNDAMENTALS OF ELECTRICAL ENGINEERING. Professor PERTSCH.
ELECTRIC POWER PLANTS. Professor LINCOLN.
ELECTRICAL DESIGN. Professor LINCOLN.
ELECTRICAL COMMUNICATION. Professor BALLARD.

ELECTRICAL LABORATORY. Professor CHAMBERLAIN and Assistant Professor BASON.

ELECTRIC RAILWAY PRACTICE. Professor CHAMBERLAIN.

CURRENT ELECTRICAL TOPICS. Professor PERTSCH.

ENGINEERING MATHEMATICS. Professor KARAPETOFF.

THE GRADUATE SEMINARY IN ELECTRICAL ENGINEERING. Professors LINCOLN and KARAPETOFF. A topic is selected each year to suit the range of interests and the preparation of the students taking it. The primary purpose is to acquaint the students with modern research on the border line between physics and electrical engineering, in topics which are expected to become of practical importance within the next few years.

*INDUSTRIAL ENGINEERING

Professors D. S. KIMBALL, A. E. WELLS, and M. A. LEE.

Under this heading is included the consideration of the organization, administration, and equipment of industrial enterprises. The library of the college is well supplied with literature relating to the various branches of this field of engineering, and access may be had to the special libraries on economics in the University Library and in the Department of History and Political Science. Attention is directed to the courses in History and Political Science which may be profitably pursued in conjunction with work in industrial engineering.

In order to take the advanced course in this department, the student must not only have had the equivalent of the undergraduate course in mechanical engineering, but must also have taken the courses in industrial engineering and economics required of seniors who elect the special work of this branch.

No regular courses of instruction are offered to graduate students; but the regular courses required of seniors taking the industrial engineering option in the College of Engineering are open to graduate students as courses suitable for their minor subjects. The instructing staff in this department is prepared to direct study and investigation in Industrial Organization, Industrial Management, Plant Design, and Safety Engineering and Fire Protection.

INDUSTRIAL ORGANIZATION AND ADMINISTRATION. Professors KIMBALL, WELLS, and LEE.

DRAWING AND DESIGN. Professor LEE.

*RURAL ENGINEERING

Professors H. W. RILEY, B. B. ROBB, J. C. MCCURDY, F. L. FAIRBANKS, and F. H. RANDOLPH.

Students desiring to undertake graduate work in Rural Engineering should have, first of all, first-hand knowledge of farm life and of rural conditions generally. Adequate grounding in the engineering fundamentals of the phase studied and ability to perceive the applications of these fundamentals are most essential, since the applications of engineering practices to agriculture, though of great economic importance, are usually successful in proportion as they are direct and simple. Whether a student's preparation is adequate for any given line of advanced study can be determined only by special consideration of each case. Country life experience, alertness, originality, and interest are important factors for success. If the technical engineering phases of the proposed work largely predominate over the agricultural, the student should normally major in the appropriate school of the College of Engineering with a minor in Rural Engineering. If economic or pedagogical problems predominate, the major work would normally be taken in the department of Agricultural Economics or of Rural Education.

The teaching of Rural Engineering subjects, especially in Junior project work and in agricultural high schools, is a topic of general interest in the department and the subject for most of the graduate work. All the courses of the department are studied as to their content and method with especial emphasis usually on Farm Shop Work. Knowledge of educational methods is prerequisite.

FARM MECHANICS; FARM POWER MACHINERY; HOUSEHOLD MECHANICS; FARM ENGINEERING; DRAINAGE; FARM CONCRETE; FARM STRUCTURES; FARM SHOP WORK; MECHANICAL DRAWING; MECHANICAL PERSPECTIVE; INSTITUTIONAL ENGINEERING.

FARM POWER MACHINERY. An advanced course in farm tractors, power plows, and tractor plowing, with plenty of actual work with modern equipment. Knowledge of single cylinder engine principles and electric ignition theory and practice is prerequisite.

DRAINAGE. The course offers opportunity for advanced study of drainage methods through the many actual problems to be found on the college farms and in connection with the large amount of extension work in drainage which is being constantly carried on by the extension force. Superior surveying instruments are available. Knowledge of drawing, surveying, soils, and crops is prerequisite.

FARM STRUCTURES. The course offers opportunity for drawing room work on structures in addition to special studies made in connection with the department extension work. Ventilation is of prominent interest and is being investigated by staff members. Knowledge of drawing, engineering principles, animal requirements and barn practices is prerequisite.

RESEARCH IN RURAL ENGINEERING. Professors RILEY, ROBB, MCCURDY, FAIRBANKS, and RANDOLPH.

THE PHYSICAL SCIENCES

*ASTRONOMY AND GEODESY

*TOPOGRAPHIC AND GEODETIC ENGINEERING

Professor S. L. BOOTHROYD, Astronomy and Geodesy; *Professor* P. H. UNDERWOOD, Topographic and Geodetic Engineering.

A graduate student may select a major or minor subject in Astronomy or in Topographic and Geodetic Engineering.

A major in Astronomy will be required to take Modern Astronomy, Geodetic Astronomy and Geodesy and Practical Astronomy. He must offer as preliminary to his graduate study, General Astronomy, Engineering Astronomy and such courses in Mathematics and Physics as will be determined by the nature of the graduate work which he proposes to follow in Astronomy. He is further advised to take his minors in Mathematics or Physics.

Those majoring in Topographic and Geodetic Engineering must offer as preliminary training the regular course in Civil Engineering or its equivalent, electing General Astronomy and Engineering Astronomy in that course. They will be required to take Geodetic Astronomy, Least Squares and Adjustment of Observations and Geodesy as well as advanced courses in Calculus and Mechanics.

A graduate student who desires either Astronomy or Topographic and Geodetic Engineering as a minor subject will be held to substantially the same preliminary requirements as those majoring in these lines except that the requirements in Mathematics or Physics may not be quite so rigid.

For the practical work at the Observatory the equipment includes, besides the Irving Porter Church Memorial Telescope, a superb 12-inch equatorial; an astronomical transit by Troughton and Simms; an astronomical transit and a zenith telescope by Fauth, altazimuths by Troughton and Simms and Fauth; a Howard Siderial Clock; and other necessary equipment.

The geodetic equipment is one of the most extensive in the country and includes among other things a Mendenhall Half-second Pendulum Apparatus of the pattern used in the United States Coast and Geodetic Survey, also comparators and other equipment for the investigation of standards of length.

For Graduates and Undergraduates

(For fuller description see the Announcement of the College of Engineering)

MODERN ASTRONOMY. Professor BOOTHROYD.

GEODETIC ASTRONOMY. Professor BOOTHROYD.

PRACTICAL ASTRONOMY. Professor BOOTHROYD.
LEAST SQUARES: ADJUSTMENTS OF OBSERVATIONS. Professor UNDERWOOD.
ADVANCED TOPOGRAPHIC SURVEYING. Professor UNDERWOOD.
GEODESY. Professor UNDERWOOD.

Primarily for Graduates

GEODETIC ASTRONOMY. Professor BOOTHROYD. In this course the student undertakes a critical study of the astronomical transit, the zenith telescope, and the altazimuth instrument, determining the instrumental constants for as many of the instruments as time permits, besides making observations for time, latitude, and azimuth, such observations to be of the highest degree of refinement attainable.

GEODESY AND GEODETIC LABORATORY. Professors BOOTHROYD and UNDERWOOD. Special topics such as isostacy and the figure of the earth and advanced problems involving the application of the theory of least squares to the solution of geodetic problems may be considered; laboratory investigation such as the determination of the intensity of gravity or the study of standards of length or of special geodetic instruments may also be undertaken. The amount of work and the investigations undertaken will be arranged for each student.

PRACTICAL ASTRONOMY. The study of planetary detail, including micrometrical measurements on moon and planets as well as measurement of double stars, may be undertaken; also measurements of spectrograms for determination of stellar radial velocities. Complete series of spectrograms for the determination of the orbits of spectroscopic binaries may always be obtained so that such a problem may be carried through to completion.

The Department of Astronomy is not at present prepared to conduct advanced courses in Celestial Mechanics and Theoretical Astronomy or advanced work in Astronomical Spectroscopy other than that mentioned in connection with the course in Practical Astronomy. Study along these lines may be undertaken by students under the direction of the head of the department. Students contemplating an astronomical career are advised to arrange, in consultation with the head of the department, for courses in Mathematics, Physics, and Astronomy which will fit them to prepare for fellowships in some of the research observatories which give full opportunities for the development of the student's research abilities.

*PHYSICS

Professors ERNEST MERRITT, J. E. TREVOR, FREDERICK BEDELL, F. K. RICHTMYER, R. C. GIBBS, C. C. BIDWELL, E. H. KENNARD, H. E. HOWE, C. C. MURDOCK, J. R. COLLINS, and F. G. TUCKER; *Messrs.* R. M. FISHER, A. R. RIDDLE, and E. E. ZIMMERMAN.

Opportunities are offered for study and investigation in both theoretical and experimental physics. More complete information than that given below can be obtained through correspondence addressed to the Department of Physics or to individual members of the staff.

About forty rooms in Rockefeller Hall are set aside for research. This work is organized separately with its own equipment, stock, and apparatus room, special workshop for the use of graduate students, appliances for the production, handling, and liquefaction of air and other gases, power-driven vacuum pumps, X-ray apparatus, a refrigerating plant, and a dynamo laboratory well equipped with various sorts of direct and alternating current apparatus. An instrument maker's shop and two mechanicians are available for the construction and repair of apparatus.

Members of the staff will be especially interested in directing research as follows: Professor Bedell, in electricity and magnetism, theoretical and experimental, particularly in alternating current phenomena, and in aerodynamics; Professor Bidwell in high and low temperature measurements and heat; Professor Collins, in spectroscopy, particularly in the infra-red; Professor Gibbs, in spectroscopy and luminescence; Professor Howe, in optics; Professor Kennard, in

theoretical physics, especially in the theory of radiation and in quantum theory; Professor Merritt, in experimental physics, particularly in electricity and magnetism and problems connected with luminescence; Professor Murdock in electrolytic conduction and polarization, particularly in photo-active cells; Professor Richtmyer, in photometry, illumination and X-rays; Professor Trevor, in the theory of thermodynamics; Professor Tucker, in electron emission and ionization.

Members of the staff who are in residence in Ithaca during the summer often stand ready to consult with investigators.

Students desiring to undertake graduate work as candidates for a degree must ordinarily have completed not less than two years of undergraduate work in physics.

As a major or minor subject in physics it is usual to name either a particular aspect of physics,—as general physics, theoretical physics, experimental physics, applied physics,—or some particular field in physics,—such as mechanics, heat, light, electricity. One aspect or field may be combined with another, or with a subject outside of physics, to form a single subject. *Physics* may be named as a subject when the other subjects are outside of physics.

The courses listed below, for graduates and undergraduates, require as preparation, for the most part, a knowledge of calculus and either thorough textbook work in general physics, or laboratory work in physical measurements, or both. For an exact statement of these prerequisites and for a description of the elementary courses see the Announcement of the College of Arts and Sciences.

Lectures by Professor H. A. Lorentz

During the first semester, until the Christmas recess, Professor H. A. Lorentz, of the University of Leiden, Holland, will be in residence to give a series of lectures on Recent Developments in Physics, and to confer with graduate students and others with regard to experimental and theoretical problems.

For Graduates and Undergraduates

General Courses

Teaching of Physics. Mr. Fisher.

Advanced Laboratory Practice. Professor Murdock and Professor Tucker. Individual work intended for those wishing to investigate special topics, or to develop technique in preparation for research work. Lectures will include an introductory discussion of the theory of measurements and its laboratory applications.

Mechanics. Professor Gibbs. Analytical mechanics, based upon Jeans' *Theoretical Mechanics.*

Properties of Matter. Professor Bidwell. A study of gravitation, elasticity, surface tension, viscosity and the flow of fluids.

[Electricity and Magnetism. Professor Murdock. A study of the fundamentals, based upon Starling's Electricity and Magnetism for Advanced Students. Not given in 1926–27.]

Light. Professor Collins. Geometrical and physical optics, based upon Houston's *Treatise on Light.*

[Heat. Professor Bidwell. A general survey of the experimental facts and an elementary discussion of thermodynamics and kinetic theory and their applications. Not given in 1926–27.]

[Wave Motion and Sound. Professor Collins. The general properties of plane elastic waves, waves on the surface of liquids, and plane electromagnetic waves, and a study of sound based upon Barton's *Textbook on Sound.* Not given in 1926–27.]

Introduction to Modern Physical Theories. Professor Richtmyer. A summary of the development and present interrelations of such subjects as electromagnetic theory, photoelectricity, spectrum phenomena, electron theory, X-rays, radio activity, and quantum theory, and the bearing of these on the structure of the atom and on other problems of modern physics.

SPECIAL TOPIC COURSES

[AERODYNAMICS AND THE MECHANICS OF FLIGHT. Professor BEDELL. A study of horizontal flight, climbing, gliding, propellers, airplane characteristics and conditions for stability. Not given in 1926–27.]

[HIGH TEMPERATURE MEASUREMENTS. Professor BIDWELL. The calibration and use of thermo-junctions, resistance thermometers, radiation and optical pyrometers; the construction of arc and resistance furnaces for the laboratory; a study of properties of materials at high temperatures, with such original problems as time permits. Not given in 1926–27.]

ADVANCED PHOTOGRAPHY. Mr. RIDDLE. To meet the needs of those who wish to utilize photography in some specialized field of investigation, or for those who wish either to make further study of some phase of the photographic process, or to take up some problem in photographic research.

[ELECTRIC WAVES AND OSCILLATIONS. Experimental lectures. Professor MERRITT. Not given in 1926–27.]

ELECTRIC WAVES AND OSCILLATIONS. Laboratory. Professor MERRITT and Mr. ZIMMERMAN.

ELECTRICAL CONDUCTION IN GASES. Experimental lectures. Professor MERRITT.

SPECIAL TOPICS IN RECENT EXPERIMENTAL PHYSICS. Experimental lectures. Professors MERRITT, GIBBS, and RICHTMYER.

Primarily for Graduates

GENERAL COURSES

[MECHANICS. Professor KENNARD. The mechanics of systems of particles and of rigid bodies; generalized coordinates and Hamilton's Principle; the fundamental theory of fluid motion and of elasticity. Not given in 1926–27.]

ELECTRICITY AND MAGNETISM. Professors MERRITT and COLLINS. The classical theory and its interpretation in terms of electrons, omitting some parts that involve specialized mathematics; the modern theory of radiation and of the electromagnetic field.

[PHYSICAL OPTICS. Professor HOWE. The wave theory of interference, diffraction, and polarization; the electromagnetic theory of dispersion and absorption. Not given in 1926–27.]

[APPLICATIONS OF THERMODYNAMICS IN PHYSICS. Professor MERRITT. Not given in 1926–27.]

PHYSICS SEMINARY. Professor MERRITT. In addition to the Seminary, other groups are usually formed for the discussion of current problems and literature.

SPECIAL TOPIC COURSES

SPECIAL TOPICS. Reading in any branch of physics, experimental or theoretical, under the guidance of some member of the staff, supplemented by reports and regular conferences. In theory, possible topics among many are elasticity, fluid motion, theory of sound, the electro-magnetic field; or a narrower field, including its recent developments, may be chosen.

[THEORY OF MEASUREMENTS. Professor MURDOCK. Not given in 1926–27.]

[KINETIC THEORY OF MATTER AND QUANTUM THEORY. Professor KENNARD. Elements of the kinetic theory and statistical mechanics, and of the quantum theory, with illustrations from thermal radiation, specific heats, photo-electricity, X-rays, and optical spectra. Not given in 1926–27.]

[QUANTUM MECHANICS. Professor KENNARD. A study of certain topics in higher dynamics and in statistical mechanics followed by a discussion of the quantum principle, adiabatic invariants, the correspondence principle and the problems of emission and absorption, with applications to illustrate the principles. Not given in 1926–27.]

THERMODYNAMICS. Professor TREVOR.

SPECTROSCOPY and LUMINESCENCE. Lectures, assigned reading, and laboratory. Professor GIBBS.

ATOMIC STRUCTURE. Professor GIBBS. The development of modern atomic theory and its application in the explanation of spectral series, resonance and ionizing potentials, fine structure, luminescence, and chemical combinations; the structure of the nucleus as revealed by radioactive and isotopic phenomena and the effects of high-speed bombardment.

[X-RAYS AND THE STRUCTURE OF MATTER. Professor RICHTMYER. The production and measurement of X-rays, including gamma rays; laws of emission, scattering, and absorption; the bearing of these phenomena on atomic structure, crystal structure, quantum theory, and similar problems. Not given in 1926–27.]

[CONDUCTIVITY AND MAGNETIZATION. Professor KENNARD. The electron theory of conductivity, thermo-E. M. F.'s, contact potential and the Hall and allied effects; the modern theory of magnetization. Not given in 1926–27.]

[ELECTRICAL CONDUCTION IN GASES. Lectures and assigned reading. Professor TUCKER. The motion of ions and electrons in gases; thermionic emission and photo-electricity. Not given in 1926–27.]

MEASUREMENT OF PHOTO-ELECTRIC, THERMIONIC AND IONIZATION CURRENTS. Laboratory. Professor TUCKER.

ALTERNATING CURRENTS. Professor BEDELL. A study of the underlying principles of alternating electric currents; the development of graphical methods of analysis as a basis for testing and for the solution of practical problems.

ELECTRICAL LABORATORY. Professor BEDELL and Mr. REICH. Testing of direct and alternating-current apparatus, and the investigation of special problems.

ADVANCED ALTERNATING CURRENTS. Professor BEDELL. A seminary on the theory and measurement of alternating currents.

GEOLOGY

Professors H. RIES, G. D. HARRIS, A. C. GILL, O. D. VON ENGELN, and C. M. NEVIN.

Under the general title of geology are included dynamic and structural geology, physical geography, mineralogy, crystallography, petrography, paleontology and stratigraphic geology, economic geology.

Graduate work in Geology may include, in addition to work done in Ithaca, the opportunity of spending part of the time in investigation under approved direction in the field away from Ithaca.

The University Library has a most extensive collection of private publications, magazines, and geological society transactions, as well as files of North American, European, and other Geological Survey reports. In the Geological Department there is the entire library of the late Professor H. S. Williams, which is especially rich in reprints.

Special rooms are also available for graduate students for carrying on research work.

The department is provided with apparatus for different kinds of photographic work, and for polishing and sectioning ores, minerals, and rocks.

A seismograph station is situated in McGraw Hall.

*DYNAMIC AND STRUCTURAL GEOLOGY

Professor NEVIN.

Under this branch is also included work in metamorphism and sedimentation. A student taking a major in this branch of geology must first have had at least elementary work in such other branches of geology as the professor in charge may prescribe.

For Graduates and Undergraduates

STRUCTURAL GEOLOGY.

GEOLOGIC MODEL MAKING.

Primarily for Graduates

METAMORPHIC GEOLOGY. Devoted chiefly to the study of the principles of rock alteration such as contact, hydrothermal, and regional metamorphism, and

weathering. Lectures and laboratory. Laboratory consists of making calculations of rock alterations and study of specimens and slides.

SEDIMENTATION. A study of the formation of sedimentary rocks both physically and chemically and the interpretation of sediments in the geologic column. Lectures and laboratory. Laboratory work consists of actual experimentation with sediments in specially arranged tanks, of an examination of sands of various origins, and field work.

SPECIAL WORK IN STRUCTURAL GEOLOGY. For advanced students and graduates. Original investigation adapted to the needs of the student.

*PHYSICAL GEOGRAPHY

Professor VON ENGELN.

The region around Ithaca affords exceptionally excellent and varied illustrations of physiography and glaciology. For many years the teachers and advanced students of physical geography have been engaged in an investigation of the local field problems, and there is further opportunity of this kind. There are also excellent facilities for indoor work. The main laboratory is well equipped with topographic maps and photographs; the collection of relief models is notably complete, and there is an experimental laboratory with apparatus and facilities for carrying on a variety of experiments in the development of land forms, etc.

A candidate for an advanced degree whose major subject is in physical geography should have completed, during his undergraduate training, elementary university study in physics (including an advanced course in heat), chemistry, mathematics, and economics, in addition to introductory courses in physical geography and geology.

For Graduates and Undergraduates

GEOGRAPHY OF NORTH AMERICA.
COMMERCIAL GEOGRAPHY.

Primarily for Graduates

GLACIERS AND GLACIATION. This consists of a study of living glaciers and the phenomena of the glacial period. Lectures, readings, laboratory and field work. Mapping and interpretation of glacial deposits.

ADVANCED PHYSIOGRAPHY. Particular problems, reading or field investigation, to suit needs of students. In general graduate students with a minor in Physical Geography are expected to undertake work in this course.

SEMINARY. Reviews of current literature or the original literature on some phase of the subject.

*MINERALOGY, CRYSTALLOGRAPHY, AND PETROGRAPHY

Professor GILL.

The laboratory equipment is relatively good as regards petrographic microscopes, apparatus for chemical and physical investigations of rocks, and apparatus for special crystallographical determinations. There are also collections of rocks and study collections of minerals. The largest of the latter include the Benjamin Silliman, Junior, collection.

Special graduate courses in this division are not offered, but advanced work is adapted to the needs of the individual. Two of the less special courses are, however, so dependent on a rather advanced knowledge of physics or of chemistry or of both that they are to be considered as requiring the maturity of graduates, although open also to undergraduates with sufficient preparation. These are the courses in optical determination of minerals and petrography. For graduate work in these subjects a student should have chemistry including quantitative analysis and a good knowledge of general physics. For petrography he should have also not less than a year of general geology.

For Graduates and Undergraduates

CRYSTALLOGRAPHY.
MINERALOGY.
CRYSTAL MEASUREMENT AND DRAWING.
OPTICAL DETERMINATION OF MINERALS.
PETROGRAPHY.

Primarily for Graduates

SEMINARY IN MINERALOGY AND CRYSTALLOGRAPHY. This course is devoted chiefly to comment on current literature, with occasional discussion of classical treatises. Original investigations by members of the class are also sometimes considered.

ADVANCED WORK IN MINERALOGY OR PETROGRAPHY. This is planned to suit the requirements of individual students.

*PALEONTOLOGY AND STRATIGRAPHIC GEOLOGY

Professor HARRIS.

The University is so situated that excellent exposures of Devonian formations are at its very door, and the typical sections of New York State which are of fundamental importance in American paleozoic geology are within short excursion range. The most important of these are the Rochester and Niagara gorges, Trenton Falls and the Helderberg escarpments, the Chemung Valley, and the coal fields in northern Pennsylvania.

Excellent facilities are afforded to those desiring to study the later formations, since the department owns extensive collections made in the West Indies, Central and South America, as well as different parts of the United States and Europe. There is also the Newcomb collection (10,000 species) of recent shells; and an exceptional wealth of conchological literature in the geological and the general library. The *Bulletins of Ameican Paleontology* and *Palæontographica Americana*, the only paleontological journals in the country, are published in the department.

For Graduates and Undergraduates

GEOLOGICAL SURVEYING.
INVERTEBRATE PALEONTOLOGY.

Primarily for Graduates

GENERAL STRATIGRAPHIC GEOLOGY. An attempt is made during each year to look over the general geographic distribution of the geologic systems throughout the world (using English, French, German, and Spanish literature), noting the broader structural features and the fossil contents of the rocks. Considerable attention is paid to the historic development of stratigraphic geology and paleontology with emphasis on the rôle played by each great leader in these phases of geologic science.

SPECIAL AND RESEARCH WORK. The field is so broad and the topics so various that no description can be given adequately covering desirable courses of investigation. Suffice it is to say that materials are being brought together, in the form of field notes, extensive collections, and library facilities, so that this Department is justly regarded as the mecca for those desiring to work in the Cenozoic geology of the Western Hemisphere.

*ECONOMIC GEOLOGY

Professor RIES.

The work in economic geology is designed to familiarize the student with the origin, occurrence, and distribution of the mineral products of economic value, and also with the practical application of geological principles. The laboratory contains an excellent study collection of economic materials from the United States, Canada, Mexico, and Europe, including ores, fuels, clays, abrasives, building stones, etc., most of these representing suites of material collected by members of the staff of instruction on geological trips. This collection is supplemented by maps and models.

In addition to the collections, the economic geology laboratory has facilities for general work and research on economic materials; the equipment for metallographic work on ores and for clay investigation is excellent.

The work of graduate instruction consists in part of lectures and in part of special work arranged to suit the needs of the individual student. Students who are registered for a major subject in economic geology are expected to engage in research, which should preferably be based on field work.

Excursions may readily be taken to the anthracite regions of Pennsylvania; to the iron, slate, cement, and talc region near Easton, Pa.; to the magnetite mines of the Adirondacks, etc. Field trips of greater or less length are taken to some of these localities every year.

For Graduates and Undergraduates

ECONOMIC GEOLOGY. Professor RIES.

OIL GEOLOGY. Assistant Professor NEVIN.

Primarily for Graduates

CLAY INVESTIGATION. Laboratory work and lectures. A study of the geology of clays and the laboratory methods for determining their properties and uses.

ADVANCED WORK IN ECONOMIC GEOLOGY. Chiefly laboratory work, but also lectures and reading on the geology and distribution of both non-metallic and metallic deposits.

SEMINARY IN ECONOMIC GEOLOGY. This course takes up a review of the current literature in economic geology, or in some years there may be substituted for this review a discussion by members of the class of the mineral resources of certain countries, or certain groups of mineral deposits.

*METEOROLOGY

Professor R. A. MORDOFF.

A broad field for investigation and research is offered in meteorology. The weather and climatic factors, in their relation to crop distribution and production and to engineering, transportation, economic and social problems, are suitable subjects for graduate study.

The library of the Weather Bureau observatory, which is located in Roberts Hall, contains the meteorological data for such correlation studies. In addition, the library of the U. S. Weather Bureau at Washington, D. C., may be drawn upon for works of reference under proper restrictions.

A graduate student in meteorology should have completed the elementary courses in meteorology and climatology, physics, mathematics, geology, and preferably elementary statistics.

CLIMATOLOGY. Professor MORDOFF. A course covering general climatology, and the various climates of the United States with emphasis on those of New York State.

RESEARCH. Professor MORDOFF. Original investigations in meteorology and climatology.

SEMINARY. Professor MORDOFF. Preparation and reading of reports on special topics. Abstracts and discussions of papers dealing with the current literature of meteorology and climatology.

CHEMISTRY

Professors L. M. DENNIS, W. R. ORNDORFF, W. D. BANCROFT, G. W. CAVANAUGH, E. M. CHAMOT, A. W. BROWNE, F. H. RHODES, T. R. BRIGGS, M. L. NICHOLS, JACOB PAPISH, and A. E. MCKINNEY; *Doctors* F. R. GEORGIA, C. W. MASON, E. B. JOHNSON, and R. B. COREY, and Mr. C. W. TUCKER.

A graduate student who desires to take either a major or a minor subject in chemistry may select any one of the following eight branches: inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, optical chemistry, sanitary chemistry, industrial chemistry, agricultural chemistry. Under the present procedure, both the major subject and the one minor subject, required

for the degree of Master of Arts, Master of Science, or Master of Chemistry, and both the major subject and the two minor subjects required for the degree of Doctor of Philosophy may be selected from the eight divisions mentioned above, but it is desirable that candidates for the degree of Doctor of Philosophy select at least one minor subject outside of chemistry.

A graduate student who desires to take a minor subject in chemistry with some field other than chemistry as the major subject, will be required to offer introductory courses in inorganic chemistry, qualitative analysis and quantitative analysis as preliminary to his graduate study. The work upon his minor subject in chemistry may be taken in any branch of the subject that he is qualified to pursue, and may comprise advanced courses selected from the subjoined list, with the approval of his special committee.

Candidates for the degree of Master of Arts or Master of Science with major in chemistry will be required to offer, as preliminary to their graduate work, introductory courses in the following prerequisite subjects: inorganic chemistry, qualitative analysis, quantitative analysis, and organic chemistry. They will be required to take, either in connection with their major or minor work, or in addition to it, the course in introductory physical chemistry, unless the substantial equivalent of this work has been offered at entrance.

Before admission to candidacy for the degree of Master of Chemistry, students must have completed the requirements for the degree of Bachelor of Chemistry at Cornell University, or must offer the full equivalent of these requirements if they enter from other institutions.

Candidates for the degree of Doctor of Philosophy with major in chemistry will be expected to offer, as preliminary to their graduate work, introductory courses in inorganic chemistry, qualitative analysis, quantitative analysis, organic chemistry, and physical chemistry, as well as courses in chemical spectroscopy, chemical microscopy, gas and fuel analysis, and advanced quantitative analysis. Graduate students entering from approved universities may take, during their residence for the advanced degree, such of these prerequisite courses as they have not already pursued. If a graduate student lacks at entrance several of these preliminary courses, more than the minimum period of residence may be necessary.

*INORGANIC CHEMISTRY

Professors DENNIS and BROWNE; *Assistant Professor* MCKINNEY.

INTRODUCTORY INORGANIC CHEMISTRY. Lectures, recitations, and laboratory. Professor BROWNE and Assistant Professor MCKINNEY.

ADVANCED INORGANIC CHEMISTRY. Lectures and laboratory. Professors DENNIS and BROWNE.

[SELECTED TOPICS IN ADVANCED INORGANIC CHEMISTRY. Lectures. Professor BROWNE.]

*ANALYTICAL CHEMISTRY

Professor NICHOLS; *Doctor* COREY.

INTRODUCTORY QUALITATIVE ANALYSIS. Lectures, recitations, and laboratory. Assistant Professor NICHOLS and Dr. COREY.

ADVANCED QUALITATIVE ANALYSIS. Laboratory. Assistant Professor NICHOLS and Dr. COREY

INTRODUCTORY QUANTITATIVE ANALYSIS. Lectures, recitations, and laboratory. Assistant Professor NICHOLS and Mr. TUCKER.

ADVANCED QUANTITATIVE ANALYSIS. Lectures and laboratory. Assistant Professor NICHOLS and Mr. TUCKER.

ELECTROCHEMICAL ANALYSIS. Laboratory. Assistant Professor NICHOLS and Mr. TUCKER.

ASSAYING. Lectures and laboratory. Assistant Professor NICHOLS and Mr. TUCKER.

GAS AND FUEL ANALYSIS. Lectures and laboratory. Assistant Professor NICHOLS and Mr. MORSE.

ADVANCED GAS ANALYSIS. Lectures and laboratory. Assistant Professor NICHOLS and Mr. MORSE.

SPECIAL METHODS OF QUANTITATIVE ANALYSIS. Laboratory. Assistant Professor NICHOLS.

*ORGANIC CHEMISTRY

Professor ORNDORFF.

INTRODUCTORY ORGANIC CHEMISTRY. Lectures and laboratory. Professor ORNDORFF.

ADVANCED ORGANIC CHEMISTRY. Lectures and laboratory. Professor ORNDORFF.

THE COAL TAR DYESTUFFS. Lectures and laboratory. Professor ORNDORFF.

[STEREOCHEMISTRY. Lectures. Professor ORNDORFF. Not given in 1926–27.]

METHODS OF ORGANIC ANALYSIS. Laboratory. Professor ORNDORFF.

*PHYSICAL CHEMISTRY

Professors BANCROFT and BRIGGS.

INTRODUCTORY PHYSICAL CHEMISTRY. Lectures and laboratory. Professor BRIGGS.

ADVANCED PHYSICAL CHEMISTRY. Lectures and laboratory. Professors BANCROFT and BRIGGS.

APPLIED COLLOID CHEMISTRY. Lectures. Professor BANCROFT.

APPLIED ELECTROCHEMISTRY. Lectures and laboratory. Professor BRIGGS.

THEORETICAL ELECTROCHEMISTRY. Lectures. Professor BANCROFT.

*OPTICAL CHEMISTRY

Professors CHAMOT and PAPISH; *Doctor* MASON.

INTRODUCTORY CHEMICAL SPECTROSCOPY. Lectures and laboratory. Assistant Professor PAPISH.

ADVANCED CHEMICAL SPECTROSCOPY. Laboratory. Assistant Professor PAPISH.

SPECTROGRAPHIC METHODS. Laboratory. Assistant Professor PAPISH.

SPECIAL METHODS IN OPTICAL CHEMISTRY. Lectures and laboratory. Assistant Professor PAPISH.

INTRODUCTORY CHEMICAL MICROSCOPY. Lectures and laboratory. Professor CHAMOT and Dr. MASON.

ADVANCED CHEMICAL MICROSCOPY. Laboratory. Professor CHAMOT and Dr. MASON.

SPECIAL METHODS IN CHEMICAL MICROSCOPY. Lectures. Professor CHAMOT and Dr. MASON.

MICROSCOPY OF COMMERCIAL ALLOYS. Laboratory. Professor CHAMOT and Dr. MASON.

MICROSCOPY OF FOODS AND BEVERAGES. Laboratory. Professor CHAMOT and Dr. MASON.

INTRODUCTORY PHOTOMICROGRAPHY. Laboratory. Professor CHAMOT and Dr. MASON.

*SANITARY CHEMISTRY

Doctor GEORGIA.

INTRODUCTORY SANITARY CHEMISTRY (Foods). Lectures and laboratory. Dr. GEORGIA.

INTRODUCTORY SANITARY CHEMISTRY. (WATER). Lectures and laboratory. Dr. GEORGIA.

ADVANCED SANITARY CHEMISTRY. Lectures and laboratory. Dr. GEORGIA.

SANITARY CHEMISTRY (DISINFECTANTS). Lectures. Dr. GEORGIA.

*INDUSTRIAL CHEMISTRY

Professor RHODES; *Doctor* JOHNSON.

INDUSTRIAL CHEMISTRY. Lectures and laboratory. Professor RHODES and Dr. JOHNSON.

SELECTED TOPICS IN INDUSTRIAL CHEMISTRY. Lectures. Professor RHODES.

THE CHEMISTRY OF FUELS. Lectures. Professor RHODES.

CHEMICAL PLANT DESIGN. Conferences and calculation periods. Professor RHODES and Dr. JOHNSON.

CHEMISTRY OF PULP AND PAPER. Lectures. Dr. JOHNSON.

*AGRICULTURAL CHEMISTRY

Professor CAVANAUGH.

INTRODUCTORY AGRICULTURAL CHEMISTRY (FERTILIZERS, INSECTICIDES, SOILS). Lectures and laboratory. Professor CAVANAUGH and Mr. MISCALL.

INTRODUCTORY AGRICULTURAL CHEMISTRY (FOODS AND FEEDS). Lectures and laboratory. Professor CAVANAUGH and Mr. MISCALL.

ADVANCED AGRICULTURAL CHEMISTRY. Laboratory. Professor CAVANAUGH and Mr. MISCALL.

ELEMENTARY CHEMISTRY OF FOOD PRODUCTS. Lectures. Professor CAVANAUGH.

THE BIOLOGICAL SCIENCES

BOTANY AND PLANT PHYSIOLOGY

Professors K. M. WIEGAND, LEWIS KNUDSON, DONALD REDDICK, A. J. EAMES, L. W. SHARP, O. F. CURTIS, W. C. MUENSCHER, L. C. PETRY, and E. F. HOPKINS.

Graduate work is offered in physiology, anatomy, morphology, cytology, taxonomy and economic botany. A portion of the graduate research in plant pathology is conducted in the botanical laboratories.

The laboratories of the department are in Stone Hall, one of the buildings of the College of Agriculture, and are well equipped with the necessary apparatus and collections for research. The herbarium contains abundant local and foreign material for taxonomic study.

The very rich flora about Ithaca and its accessibility make the location especially advantageous for all phases of botany, as material may be easily obtained. Gardens and green-houses are also available for the growing of experimental material.

The University Library and the library of the College of Agriculture are well equipped with special works and periodicals dealing with all phases of botanical science. A department library in which are kept the books in more constant use has been established in connection with the laboratories.

A general department seminary is conducted throughout the college year. In this seminary advance in knowledge in the various phases of botany is presented and discussed. A seminary in plant physiology offers to graduate students opportunity to become familiar with current work in plant physiology and to consider the relations of this work to agricultural practices. At these meetings there are also held general conferences and discussions of opinions or methods not conveniently or appropriately dealt with in the general courses. Seminaries are conducted in taxonomy of the vascular plants and in morphology. The purpose of these various seminaries is not only to keep abreast of the literature of the subject, but to furnish to the student an opportunity to gain experience in presenting the results of his own research or in developing opinions respecting the work of others. Graduate students are expected to attend the seminaries dealing with their special fields of work.

As a prerequisite for work in general botany, anatomy, cytology, and comparative morphology, the student will be expected to have a knowledge of the fundamental features of botanical science.

A fundamental training in botany and chemistry is required of any student who expects to major in plant physiology. If it is not possible to obtain this training before entering upon graduate work at Cornell, then the student will be expected to broaden his knowledge in botany and chemistry after beginning graduate work. The advanced courses in plant physiology are required of all graduate students in plant physiology and preferably should precede research work in this field. Those students whose interests are in the science of crop production will find plant physiology of especial value.

The University conducts a Summer School of Biology in which there is opportunity for graduate study and research in botany. The school is in session for six weeks in July and August, but a longer period of study can be arranged. A prospective student contemplating summer work in botany and plant physiology should correspond with Professor Wiegand before coming to Ithaca.

In addition to various courses in the different fields of botany that are designed primarily for undergraduate students the following courses are provided and are especially conducted for graduate students.

*PLANT PHYSIOLOGY

Professors KNUDSON, CURTIS, and HOPKINS.

PLANT PHYSIOLOGY. Professors KNUDSON, CURTIS and HOPKINS. Advanced lecture course. This is a comprehensive course covering the entire field of plant physiology. Emphasis is placed not only on the fundamentals of the subject but also on research methods, and the literature of the subject is critically considered.

PLANT PHYSIOLOGY. Professors KNUDSON, CURTIS, and HOPKINS. Advanced laboratory course. This course supplements the lecture course and is designed to enable the student to acquire by laboratory work the fundamental facts of plant physiology and to enable him as well to acquire the methods and technique needed in physiological research work.

SEMINARY IN PLANT PHYSIOLOGY. Professors KNUDSON, CURTIS, and HOPKINS.

RESEARCH IN PLANT PHYSIOLOGY. Professors KNUDSON, CURTIS, and HOPKINS.

*PLANT ANATOMY

Professors EAMES, SHARP, and PETRY.

[ANATOMY. Professor EAMES. First term. A course designed to give working acquaintance with the internal morphology of vascular plants. Emphasis is placed on practice in interpretation and determination of material. It is planned primarily for advanced students in pathology, pomology, genetics and other lines of applied botany. Given in alternate years. Not given in 1926–27.]

METHODS IN HISTOLOGY AND CYTOLOGY. Professor SHARP. Second term. Designed to acquaint the student with methods employed in preparing material for histological and cytological investigation.

RESEARCH IN ANATOMY. Professors EAMES and PETRY.

*CYTOLOGY

Professor SHARP.

CYTOLOGY. Professor SHARP. Second term. An advanced course dealing with the subject matter, literature, and problems of cytology. The course is inclusive and is of special value to the geneticist. The course is intended to bring the critical knowledge of the student down to date. Round-table discussions on topics suggested by the laboratory observations and by readings, and the review of literature are important features of the course.

RESEARCH IN CYTOLOGY. Professor SHARP.

*MORPHOLOGY

Professors EAMES, SHARP, and PETRY.

MORPHOLOGY OF VASCULAR PLANTS. Professors EAMES and PETRY. First term. An advanced course in the comparative morphology and life histories of vascular plants.

(Comparative Morphology of Fungi is offered in the Department of Plant Pathology.)

SEMINARY IN MORPHOLOGY. Professors EAMES, SHARP, and PETRY.

RESEARCH IN MORPHOLOGY. Professors EAMES, SHARP, and PETRY.

*TAXONOMY

Professors WIEGAND and EAMES.

TAXONOMY OF VASCULAR PLANTS. Professor WIEGAND. First and second terms. A study of the kinds of plants, including a study of the more prominent families of the higher plants and the principles of classification. Field work, herbarium methods and the use of keys and special terms are also given attention.

SEMINARY IN TAXONOMY. Professor WIEGAND.

RESEARCH IN TAXONOMY. Professors WIEGAND and EAMES.

*PALEOBOTANY

Professors PETRY and EAMES.

RESEARCH.

*ECONOMIC BOTANY

Professor MUENSCHER.

RESEARCH.

*PLANT PATHOLOGY

Professor REDDICK.

RESEARCH.

*PLANT PATHOLOGY

Professors L. M. MASSEY, H. H. WHETZEL, M. F. BARRUS, H. M. FITZPATRICK, F. C. STEWART, F. M. BLODGETT, CHARLES CHUPP, W. H. BURKHOLDER, H. E. THOMAS, D. S. WELCH, and K. H. FERNOW.

The laboratories of the department are fully equipped for teaching and research in this subject. Many pieces of apparatus for use in connection with specialized research problems are available and additional apparatus can be supplied whenever it is needed. Greenhouses having about 2,500 square feet of floor space afford facilities for experimental work and for the culture of diseased and healthy plants for class use. These houses are divided into compartments so that various artificial conditions of temperature and moisture can be maintained for diverse types of plants and kinds of experimental work. A garden near the laboratories is available for the use of graduate students. Field laboratories in important crop sections of the State are maintained through co-operation with growers. These laboratories provide certain graduate students who receive fellowships (several of which are usually available each year) with an opportunity of pursuing investigations on a large scale under most favorable commercial conditions.

The pathological herbarium includes a local collection of fungi and pathological materials and sets of well-known fungous exsiccati. The library contains most of the important works on plant pathology, mycology, and bacteriology, complete sets of the more important journals, many monographs, and practically all the experiment station literature on these subjects.

Candidates for the Doctor's degree should spend at least one season in the field in order to come into contact with the practical aspects of control problems. Students preparing for graduate work in plant pathology are urged to obtain a thorough knowledge of elementary physics and chemistry, including organic and physical chemistry, and of general botany, plant histology, and plant physiology. A reading knowledge of French and German is indispensable in phytopathological research and must be acquired before the beginning of the second year of graduate work. Candidates for advanced degrees must have fundamental training in the subjects enumerated above. Opportunity is afforded for further study in these subjects after entering the Graduate School, but a student availing himself of this opportunity can not expect to receive a degree in the minimum amount of time required for residence. Members of the staff are prepared to direct investigation in the various sub-divisions of the broader field, including that of bacterial diseases of plants.

Courses in plant pathology and mycology are offered in the six-weeks special Summer School of Biology conducted by the University. Opportunity for gradu-

ate study and research is provided as a feature of this school. Arrangement for a longer period of study than six weeks with residence credit in the Graduate School is possible. Before coming to Ithaca, prospective students should correspond with a member of the staff concerning work contemplated.

GENERAL PLANT PATHOLOGY. Professor WHETZEL. First or second term. A fundamental introductory course treating of the nature, cause, and control of plant diseases. Designed especially for undergraduates but required of all graduate students who have not had its equivalent. This course is also offered during the six-weeks summer session.

PRINCIPLES OF PLANT DISEASE CONTROL. Professor WHETZEL. Second term. A consideration of principles and methods in plant disease control. Designed for advanced undergraduate and graduate students.

ADVANCED PLANT PATHOLOGY. Professor MASSEY. First and second terms. A presentation and analysis of the experimental and empirical knowledge of plant diseases. The phenomena of infection, susceptibility, host reactions, and symptomatology will be critically considered. Primarily for graduate students.

ELEMENTARY MYCOLOGY. Professor FITZPATRICK. First term. A synoptical course designed to acquaint the student with the general field of mycology. Emphasis will be placed on morphology and phylogeny, rather than on taxonomy. This course is also offered during the six-weeks summer session.

MYCOLOGY. Professor FITZPATRICK. First and second terms. An intensive study of the morphology, taxonomy, and phylogeny of the fungi (Phycomycetes and Ascomycetes). Primarily for graduate students.

[MYCOLOGY. Professor FITZPATRICK. First and second terms. Alternating with the course just named, and dealing with the Basidiomycetes and Fungi Imperfecti. Not given in 1926–27.]

HISTORY OF PLANT PATHOLOGY. Professor WHETZEL. First and second terms. Requires a reading knowledge of French and German. Designed especially for graduate students specializing in Plant Pathology.

GERMAN PHYTOPATHOLOGICAL READING. Professor WHETZEL. First and second terms. For graduate and advanced students. Designed to assist graduate students in preparing for their language examination requirements in German.

RESEARCH. Professors MASSEY, WHETZEL, BARRUS, FITZPATRICK, and STEWART, and Assistant Professors BLODGETT, CHUPP, BURKHOLDER, THOMAS, WELCH, and FERNOW.

SEMINARY. Members of the staff.

*PLANT BREEDING

Professors R. A. EMERSON, H. H. LOVE, C. H. MYERS, F. P. BUSSELL, A. C. FRASER, R. G. WIGGANS and R. D. LEWIS; *Doctor* ERNEST DORSEY.

The laboratories of this department are supplied with calculating machines necessary for statistical investigations, and are equipped with cameras and accessories for photographic work. The departmental library contains the principal books and periodicals dealing with plant breeding, evolution, and general genetics. The department has greenhouse room approximating 2000 square feet of floor space, a part of which is available for the use of graduate students. A garden near the laboratories affords the necessary room for most of the plant material used by graduate students. For more extensive plantings, room is provided on the University farms.

In order to enter upon graduate work in plant breeding, the student should have had the equivalent of the following courses: genetics, plant breeding, general botany, general plant physiology, elementary zoology or biology, introductory inorganic chemistry, and elementary organic chemistry. In case a student has not had all these elementary courses, he should take them early in the period of his graduate study, and since he will not be permitted to present them as partial fulfillment of the requirements for a major or a minor in plant breeding, he will ordinarily find it impossible to complete his graduate work in the minimum time.

In addition to the prerequisites listed above, it is desirable that upon entering his graduate work the student should have had the equivalent of the following courses: plant taxonomy, plant cytology, advanced plant physiology, plant pathology, and courses in either farm crops, pomology, floriculture, or vegetable gardening.

Students majoring in plant breeding will ordinarily find it necessary to remain in Ithaca during the summer, or to make satisfactory arrangements for growing and studying elsewhere the plant materials used in connection with their research problems. Since the department has accommodations for only a limited number, prospective students will find it to their advantage to correspond with a member of the departmental staff some months prior to entering upon their work.

Primarily for Graduates

BIOMETRY. Given in alternate years. A discussion of statistical methods as applied to problems in biology and genetics. The course is designed primarily to develop methods for the study of variation, correlation, curve fitting, and probable error.

GENETICS. Assistant Professor FRASER. An advanced course dealing with the following topics: the methods of genetical testing and analysis, factor interaction, factor linkage, sex inheritance, mutation, and the numerical results of different systems of breeding and selection. Particular attention will be given to the modes of attacking problems in genetics. Laboratory analyses of experimental data, and studies with Drosophila. Laboratory fee, $3.00.

RESEARCH. Professors EMERSON, LOVE, MYERS, and BUSSELL, and Assistant Professors FRASER, WIGGANS, and LEWIS.

SEMINARY. Professors EMERSON, LOVE, MYERS, and BUSSELL, and Assistant Professors FRASER, WIGGANS, and LEWIS.

ZOOLOGY, ENTOMOLOGY, AND LIMNOLOGY

Professors J. G. NEEDHAM, H. D. REED, G. W. HERRICK, O. A. JOHANNSEN, J. C. BRADLEY, R. MATHESON, G. C. EMBODY, E. F. PHILLIPS, P. W. CLAASSEN, A. H. WRIGHT, A. A. ALLEN, and B. P. YOUNG.

Every facility possible in the way of material and equipment is placed at the disposal of the student desiring to investigate in the following fields: Entomology, Limnology, Ecology, General and Experimental Zoology, Morphology of animals both descriptive and experimental, Embryology of Invertebrates, Economic Entomology, Taxonomy, Parasitology, Aquiculture.

The laboratories are equipped with modern compound, binocular, and dissecting microscopes, microdissecting and injecting apparatus, euscopes, microtomes and accessories, paraffine and constant temperature ovens, projection and drawing apparatus, facilities for modelling in wax, work shop, fully equipped preparation rooms, cameras and dark rooms.

Connected with the laboratory of Insect Taxonomy are extensive collections of both indigenous and exotic insects of all orders. These have been determined by specialists and are accessible to properly prepared students for comparison. The collection includes many sets of specimens illustrative of the metamorphoses and habits of insects. There is also an extensive collection of other invertebrates, fishes, amphibia, reptiles, birds and mammals as well as more than 12,000 specimens of fixed material for developmental and structural studies. In assembling these collections, efforts have been made to obtain material from all parts of the world illustrating biological principles.

Advanced work in Entomology is largely carried on in an insectary, a separate building; a second insectary adjacent to the laboratories is available for other phases of the work. A fish culture experiment station on the University farm affords exceptional opportunities for investigations in the biology of fresh water organisms.

The Cayuga basin, with its diversified topography, its extensive fauna, and its mingling of three life zones, offers unusual opportunities for ecological field work. Within the basin are two state parks and two wild life preserves, all within walking distance of the University; the former established on account of the beauty of

their scenery, the latter on account of their interesting fauna and flora. There is also a woodland bird preserve in Ithaca near the site of the Biological Field Station.

The special entomological library, the libraries of the agricultural and medical colleges, and the central university library afford sets of all important journals and books.

In order to undertake graduate study the student should not only be prepared in the fundamentals of Animal Biology but also have or acquire a foundation in the particular phase of this subject which he intends to pursue.

The members of the staff are prepared to direct the research work of graduate students in connection with the summer School of Biology of Cornell University.

*TAXONOMY

INSECTS. Professor BRADLEY and other members of the staff.

RESEARCH IN SYSTEMATIC ENTOMOLOGY. Professors BRADLEY, NEEDHAM, MATHESON, and JOHANNSEN.

ADVANCED SYSTEMATIC ENTOMOLOGY. Professor BRADLEY

TAXONOMY OF INSECTS. Professor BRADLEY and DR. FORBES.

INVERTEBRATES (other than Arthropods). Assistant Professor YOUNG. Arrangements may be made for the study of special groups of invertebrates.

VERTEBRATES. Professors WRIGHT and ALLEN.

ADVANCED ICHTHYOLOGY, HERPETOLOGY and ZOOGEOGRAPHY. Professor WRIGHT.

ADVANCED ORNITHOLOGY AND MAMMALOGY. Professor ALLEN.

RESEARCH IN ICHTHYOLOGY AND HERPETOLOGY. Professor WRIGHT.

RESEARCH IN GENERAL ORNITHOLOGY AND ECONOMIC ORNITHOLOGY AND MAMMALOGY. Professor ALLEN.

*MORPHOLOGY

Professors JOHANNSEN and REED and Assistant Professor YOUNG.

RESEARCH IN MORPHOLOGY AND EMBRYOLOGY OF INSECTS. Professor JOHANNSEN.

RESEARCH IN MORPHOLOGY OF INVERTEBRATES AND VERTEBRATES (including experimental studies). Professor REED and Assistant Professor YOUNG.

MORPHOLOGY AND DEVELOPMENT OF INSECTS. Professor JOHANNSEN.

COMPARATIVE ANATOMY AND MORPHOLOGY OF VERTEBRATES. Professor REED.

INVERTEBRATE ZOOLOGY AND MORPHOLOGY. Assistant Professor YOUNG.

*ECONOMIC ENTOMOLOGY

Professors HERRICK, MATHESON, and PARROTT (Geneva).

ECONOMIC ENTOMOLOGY AND INSECTARY METHODS. Professor MATHESON.

FOREST INSECTS. Professor HERRICK.

PARASITES AND PARASITISM. Professor MATHESON.

THE RELATIONS OF INSECTS TO DISEASE. Professor MATHESON.

RESEARCH IN ECONOMIC ENTOMOLOGY. Professors HERRICK, MATHESON, and PARROTT (Geneva).

RESEARCH IN PARASITOLOGY. Professor MATHESON.

RESEARCH IN MEDICAL ENTOMOLOGY. Professor MATHESON.

RESEARCH IN APICULTURE. Professor PHILLIPS.

*ECOLOGY AND LIMNOLOGY

Professors NEEDHAM, EMBODY, and CLAASSEN.

RESEARCH IN ECOLOGY OF INSECTS. Professors NEEDHAM and CLAASSEN.

RESEARCH IN LIMNOLOGY. Professors NEEDHAM, EMBODY, and CLAASSEN.

GENERAL LIMNOLOGY. Professor NEEDHAM.

RESEARCH IN AQUICULTURE. Professor EMBODY.

SEMINARY.

RESEARCH IN GENERAL AND EXPERIMENTAL ZOOLOGY. Professor REED and Assistant Professor YOUNG.

*Anatomy

Professors A. T. Kerr and J. W. Papez.

The laboratories for this subject are situated on the third floor of Stimson Hall and are admirably lighted and thoroughly ventilated. For gross dissection there is a large general laboratory, and adjoining the dissecting room is a smaller laboratory for special work, fitted with a hood and other facilities for digestion, maceration, corrosion, etc. At the end of the main dissecting room is a large dark room with a projection outfit and facilities for drawing sections for making reconstructions. Upon this floor also is situated a dark room with a complete outfit for taking photographs of special preparations for illustrating research. In the basement is a compressed air apparatus for embalming and making special injections.

There is an abundance of anatomical material, which is embalmed and kept in cold storage so as to be ready for use when needed. The refrigerating apparatus is also used for freezing specimens for sections. In addition to the undissected material, there is an ample supply of special parts, such as bones, brains, the various abdominal and thoracic organs, special sense organs, etc.

The equipment includes microscopes, dissecting microscopes, microtomes, a portable X-ray outfit, glassware, reagents, and other necessities of an anatomical laboratory.

In collaboration with the department of Histology and Embryology, every facility is offered for studying anatomical problems from both the gross and the developmental points of view.

In the library are to be found complete sets of practically all the important periodicals dealing with anatomy, and the proceedings and transactions of the learned societies. In addition, the library is well supplied with the most important anatomical monographs and books.

Graduate work in anatomy should be preceded by courses in general biology and comparative or human anatomy. A reading knowledge of German and French is essential for successful research in anatomy.

Anatomy. Dissection of the upper extremity; of the head and neck; of the thorax; of the lower extremity; of the abdominal and pelvic walls and viscera. Thoracic and abdominal viscera, section demonstrations.

Central Nervous System and Organs of Special Sense. Laboratory work on gross and microscopic preparations.

Detailed Topographical Dissection and Study of any Region.

Research and Advanced Work.

*Histology and Embryology

Professors B. F. Kingsbury and H. B. Adelmann.

The equipment for this subject comprises a supply of modern microscopes, camera lucidas, polariscopes, microspectroscopes, photomicrographic cameras, and other special apparatus, in sufficient number to give each student opportunity for learning to use them, and for applying them to any special study in which they are needed. Two projection microscopes are available for blotting paper and wax plate reconstructions. The general and research laboratories are large and are equipped with microtomes, incubators, aquaria, etc. The collection of specimens is large and constantly increasing, and comprises preserved material and embryos, as well as embryological and histological series of microscopic preparations of man, mammals, and the lower vertebrates.

In addition to the general laboratory, preparation room, and private laboratory rooms for the staff, there are for this subject a large and well-lighted advanced laboratory with three small rooms for individual workers, a photomicrographic laboratory and dark room, and a drawing and projection room. A museum of embryological models occupies the center of the advanced laboratory. The rich and varied fauna of the Cayuga Lake region affords favorable opportunity for investigation in the histology and embryology of all the main groups of vertebrates; material for the study of the development of the sheep, cow, and pig, is also available. Advanced work in histology and embryology is of necessity in-

dividual and is abundantly provided for. In addition advanced students are sometimes recommended to take some one or more of the general courses in the subject. As preliminary to graduate work, students are expected to have had the courses in the tissues and one of the following: the organs, special histology, embryology. A year's work in zoology, biology, anatomy, or physiology may with advantage precede advanced work in this subject.

ADVANCED WORK IN HISTOLOGY AND EMBRYOLOGY. Professors KINGSBURY and ADELMANN.

SEMINARY IN HISTOLOGY AND EMBRYOLOGY.

THE THEORY OF DEVELOPMENT. Lectures and outside readings. Assistant Professor ADELMANN.

*HUMAN PHYSIOLOGY AND BIOCHEMISTRY

Professors J. B. SUMNER, H. S. LIDDELL, and J. A. DYE, and an instructor.

For advanced and graduate work in experimental physiology two large laboratories and several smaller rooms are available. Laboratory A, on the first floor of Stimson Hall, is provided with electro-motor-driven shafting and Sherrington recording drums of the most recent pattern, capable of giving wide ranges of speed. All necessary apparatus is available for graphic work in muscle and nerve physiology, for the investigation of problems in connection with the circulatory and respiratory systems, where objective records are desirable (for example, movements of the excised amphibian and mammalian heart), and for the experimental study of the special senses and the central nervous system. Pendulum and spring myographs are available and several forms of ergograph for the study of muscular and nervous fatigue. Each table is supplied with chronographs and time-recording tuning-forks, induction machines, keys, switches, commutators, etc. Adjoining this laboratory are two smaller rooms; one is being equipped for experimental work on animal heat and body temperature, the other contains a Ludwig kymograph with accessories, and is used primarily for experimental physiology. There is also a dark room for photographic and optical work.

Laboratory B is devoted mainly to research. The equipment includes haemomanometers and blood-pressure apparatus of the most recent type, and six large Brodie kymographs for continuous smoked paper. A time-recording clock and artificial respiration and chloroform apparatus have just been added. Plethysmographs for recording volume changes in the various bodily organs are provided and several clock-driven drums are available.

In connection with this laboratory there is a workshop with a skilled mechanician who is capable of making and modifying any kind of apparatus which may be required for special research.

In the basement, on a solid concrete floor, a room has been equipped with galvanometers, capillary electrometers, shunts, rheocords, bridges, and all the other apparatus required in electrophysiology.

The biochemical laboratories on the second floor of Stimson Hall include a general laboratory, and a smaller laboratory for research, both fitted throughout with water, gas, suction pumps, and draught cupboards. Adjoining these are a room for metabolic work, a balance room, a constant temperature room, and storerooms for chemicals and apparatus.

The equipment, which is being steadily increased along many special lines, is suited to the investigation of problems connected with the chemistry and functions of the animal body, and includes, besides a stock of glass apparatus and the ordinary fittings of a chemical laboratory, several metabolism cages, large and small balances, polarimeter, large centrifuge, Buchner press, incubators, apparatus for measurement of H-ion concentration, Hilger wave length spectrometer, and a selection of the most important works of reference. The principal periodicals dealing with physiology and biochemistry are also kept in the building.

Recently a field station has been added to the department within two miles of the Medical College. This consists of two fenced fields, each of about five acres of orchard and pasture land, together with barn and housing for large animals

such as sheep and goats. Another fenced field of twenty acres adjacent to the station has been leased for five years and is available for pasture. On this station, which is entirely devoted to research in physiology and biochemistry, many problems are under investigation and as much of this work can be carried out by graduate students, under supervision, it may be considered as an important asset to the Graduate School.

A problem demanding original investigation is prescribed for each student, who is guided in his choice of a subject by one of the professors in charge, due consideration being given to his previous training and to the line of work in which he desires to specialize. Having selected a subject the student will be expected to concentrate his efforts upon it. While the work is done under the supervision of some one of the members of the teaching staff, and every facility provided in the way of apparatus, etc., the student is encouraged to rely on his own resources as far as possible, especially in planning and carrying out his experiments. Any special apparatus which he may require or which he may himself design, will be made for him by the laboratory mechanic. It is expected that the results of his work will be embodied in a thesis, and if this is judged to be of sufficient merit it will be published in full or in abstract in some accredited scientific journal.

The prerequisites necessary for a student intending to major in biological chemistry are inorganic chemistry, qualitative and quantitative analysis, physical chemistry, advanced organic chemistry, and physiology.

In addition to original investigation, which may be undertaken by students who have the necessary preparation, the following systematic courses are offered to graduate students:

PHYSIOLOGY OF THE CIRCULATION AND RESPIRATION. Professor ————.

PHYSIOLOGY OF MUSCULAR, NERVOUS, ALIMENTARY, EXCRETORY, AND ENDOCRIME SYSTEMS; HEAT REGULATING MECHANISMS; THE SPECIAL SENSES AND GENERAL SENSIBILITY. Professor ———— and Assistant Professor DYE.

LABORATORY. In connection with the course last named. Professor ————.

SPECIAL CHAPTERS IN BIOCHEMISTRY. Assistant Professor SUMNER.

HIGHER ACTIVITIES OF THE NERVOUS SYSTEM. Assistant Professor LIDDELL. This will consist of a critical review of the principal methods employed in the observation of animal behavior and the results obtained, preceded by a brief discussion of nerve conduction, the receptors, the nature of reflex action, etc. An attempt will be made to give a general conception of the functioning of the vertebrate nervous system. This course should be preceded or followed by the course in comparative neurology. Primarily for graduate students of animal biology and psychology. Days and hours to be arranged.

*FOOD AND NUTRITION

Professors ADELAIDE SPOHN, HELEN MONSCH, and EDITH H. NASON.

The laboratories for graduate work in food and nutrition are situated in the Building of the College of Home Economics. Two laboratories are available for the work, namely, (1) an animal laboratory, adequately equipped for nutrition work with small animals, and (2) a chemical laboratory, provided with apparatus for work in the application of chemistry to the study of food and nutrition. There is also special equipment for energy metabolism studies and a diet kitchen for use in the preparation of food for the work in human metabolism.

In order to take up graduate work in the chemistry of food and nutrition the student should have had the equivalent of the following courses: quantitative chemical analysis, biological chemistry, physiology or biology, nutrition and dietetics. In addition to the courses listed, a knowledge of physics and physical chemistry is highly desirable.

For Graduates and Undergraduates

DIET IN RELATION TO THE TREATMENT OF DISEASE. Professor MONSCH.

NUTRITION OF SCHOOL CHILDREN. Professor MONSCH.

SPECIAL PROBLEMS. Instruction by members of the departmental staff.

Primarily for Graduates

FOOD AND NUTRITION, Professor SPOHN. Advanced lecture course. First term. Primarily for graduate students, but open also to seniors with the permission of the instructor. A critical study of recent advances in food and nutrition. The purpose of the course is to acquaint students with the methods and results of recent investigations in the field.

LABORATORY METHODS IN FOOD AND NUTRITION. Professor SPOHN. An introduction to methods of investigation in foods and nutrition. Opportunity is offered for the study of methods used in feeding experiments with small animals. Laboratory fee, $8.

RESEARCH IN FOOD AND NUTRITION. Professor SPOHN, Assistant Professor NASON, and other members of the staff. This course offers opportunity for individual research in animal nutrition, human nutrition and metabolism, food chemistry, chemical changes taking place in the process of food preparation. Laboratory fee, $2.00 for each credit hour.

SEMINARY IN FOOD AND NUTRITION. Required of graduate students taking a major in this department. Professor SPOHN and Assistant Professor NASON.

*ANIMAL PATHOLOGY AND BACTERIOLOGY

Professors W. A. HAGAN, and C. M. CARPENTER.

The laboratories of animal pathology and bacteriology are well equipped for research in general pathological morphology, the pathology of infectious diseases and for bacteriological work, especially in connection with experimental pathology and immunology, but also with problems associated with the morphology and physiology of bacteria.

Candidates for advanced degrees electing pathology or bacteriology as their major subject must have had the corresponding general course given in this department, or its equivalent. Candidates electing a minor subject in this department may take up a research problem, if they possess sufficient preliminary training, or may pursue regular undergraduate course work, the courses taken to be subject to the approval of their committee. All graduate students electing work in this department are required to attend the seminar.

For a list of courses, with descriptions, see the Announcement of the New York State Veterinary College.

RESEARCH IN PATHOLOGY AND BACTERIOLOGY. Professors HAGAN and CARPENTER.

SEMINARY. Professors HAGAN and CARPENTER.

(For dairy bacteriology, see Dairy Industry and Bacteriology; for soil bacteriology, see Agronomy.)

*VETERINARY PHYSIOLOGY

Professors P. A. FISH and C. E. HAYDEN.

The department has a good equipment for the study of physiological problems in connection with the domesticated animals. The laboratories situated in the Veterinary College, are ample and are provided with modern apparatus for such research as can best be conducted in the laboratories. In the same building there is a well-assorted collection of recent books and periodicals on comparative physiology, which may be supplemented by the many works on general physiology in the University Library.

The Veterinary Experiment Station, controlled by the College, and not far distant, can be utilized for field observations and the study of those problems outside of the scope of the laboratory. This unusual combination of field and laboratory research should be conducive to important results.

As a preparation and aid in this research, attendance at the general lecture and laboratory courses in veterinary physiology is recommended.

PHYSIOLOGY RECITATIONS. THE PHYSIOLOGY OF THE NUTRITION AND SECRETION OF THE DOMESTICATED ANIMALS. THE PHYSIOLOGY OF THE MUSCULAR

AND NERVOUS SYSTEMS. PHYSIOLOGICAL LABORATORY. COURSE IN URINE ANALYSIS.

ADVANCED PHYSIOLOGY. Professor FISH and Assistant Professor HAYDEN.

*VETERINARY MEDICINE, AMBULATORY CLINIC, AND OBSTETRICS INCLUDING DISEASES OF THE GENITAL ORGANS

Professor D. H. UDALL, *Doctors* E. R. CUSHING and M. G. FINCHER.

Opportunity for the clinical study of internal diseases of animals is afforded by material in the ambulatory clinic. This clinic has gradually developed until it demands a large part of the time of two clinicians. Especially abundant are affections of dairy animals. Students are required to report their observations, and files of notes on completed cases are available for additional information. Special and research students will be given individual instruction to meet their requirements, and may supplement their clinical experience with further study in the various laboratories and museums of the College.

*DISEASES OF BREEDING CATTLE

Professors R. R. BIRCH and H. L. GILMAN.

The department has available for research in connection with the diseases of cattle a herd with a complete history of each animal. There is also an extensive collection of material illustrating various morbid conditions of the genital organs of cattle. Ample facilities are at hand for the study of the clinical and bacteriological aspects of this group of diseases.

Extensive researches are being conducted on the diseases of the genital organs of cattle, with special reference to abortion, sterility, and kindred phenomena.

*VETERINARY PHARMACOLOGY AND DISEASES OF SMALL ANIMALS

Professor H. J. MILKS.

The laboratories of the department are well equipped for research in veterinary pharmacology. The clinic supplies abundant material for research both in external and internal diseases of small animals.

There is an operating room with modern equipment and facilities for handling approximately sixty animals. The library facilities are good.

*VETERINARY SURGERY

Professor J. N. FROST.

The laboratory in surgery is well equipped for research and special study along surgical lines, especially in connection with diseases of the bones, tendons, and tendon sheaths.

Candidates for advanced degrees should have as preliminary preparation, general pathology, physiology, general and special surgery.

SPECIAL SURGERY. Professor FROST.

RESEARCH IN SURGICAL DISEASES. Professor FROST.

THE AGRICULTURAL SCIENCES

*AGRONOMY

Professors T. L. LYON, J. A. BIZZELL, H. O. BUCKMAN, J. K. WILSON, B. D. WILSON and H. P. COOPER.

Special laboratories are provided for graduate students; they are equipped for chemical and bacteriological investigations of soils and of crop production. The usual facilities for the chemical analyses of soils and plants are at hand, and permit the determination of all the constituents of the soil concerned in plant nutrition. For bacteriological work the laboratory contains in its equipment, autoclaves, sterilizers, incubators for different temperatures; and for mechanical analyses centrifuges, shaking machines, and other necessary apparatus. Two greenhouses provide opportunity for conducting crop and soil tests during the

winter, and for experiments with nutrient solutions and sand cultures. A field for plat experiments gives ample facility for work on a larger scale. In this field a series of lysimeters, each holding between three and four tons of soil have been built. Pipes from these tanks carry the drainage water into a tunnel where it is collected for measurement and analysis. These varied and extensive facilities afford opportunity for students trained in any one or more of the several sciences to investigate soil or plant nutrition problems.

A complete set of the soil maps of the United States is arranged in form for ready reference. The University Library is unusually well supplied with the publications in which the literature of soil science is to be found.

A graduate student who desires to make agronomy his major subject should have had sufficient training in analytical chemistry or in bacteriology to give him a command of the technique as well as the principles of the subject. It is also desirable that he should have had enough technical agriculture to enable him to see the agricultural bearing of the work.

Primarily for Graduates

SOILS, ADVANCED COURSE. Professor BIZZELL. First term. Students must consult Professor Bizzell before registering for the course. An advanced course designed particularly for students specializing in soil technology. The lectures deal with the important properties of soils from the theoretical and technical standpoints. Review of the literature and preparation of papers are important parts of the work.

SOILS, ADVANCED LABORATORY COURSE. Professor BIZZELL. First term. A course designed primarily for special training in methods used in soil investigation.

SOIL BACTERIOLOGY. Professor J. K. WILSON. Second term. A course in biological soil processes designed primarily for graduate students. The laboratory work will be supplemented by reports and by abstracts of important papers on the subject. Laboratory fee, $5.

RESEARCH. Professors LYON, BIZZELL, BUCKMAN, and J. K. WILSON, and Assistant Professors B. D. WILSON and COOPER.

SEMINARY. Required of graduate students taking work in the department.

*FLORICULTURE AND ORNAMENTAL HORTICULTURE

Professors E. A. WHITE, A. C. BEAL, and R. W. CURTIS.

The field of investigation and research in floriculture and ornamental horticulture is a broad one, and there are excellent opportunities for original work in these subjects. Studies in variation, nutrition, or in regard to the culture and improvement of plants may be undertaken. Monographic studies on the various genera of ornamentals offer an important field of research. Summer work is of special importance in studying plant materials, and it is desirable that candidates for the Master's degree spend at least one summer at the University. This is required of all candidates for the Doctor's degree.

Every candidate for an advanced degree must have had a thorough training in general biology, botany, economic entomology, soils, fertilizers, and genetics. A student who takes his major subject in the department must already have had the courses noted below or their equivalent, excepting only the advanced courses. A student who takes his minor subject for the Master's degree in this department of study may register for these courses. Each student is required to deposit a typewritten copy of his thesis with the department.

In addition to the classroom and laboratory equipment, a range of greenhouses, aggregating sixteen thousand square feet of glass, is now available for instructional purposes. The department has about thirty acres of land devoted to nurseries and to field experiments with peonies, gladioli, irises, roses, asters, and other annual and perennial plants. This area also furnishes material for laboratory exercises.

The library equipment consists of a large and steadily increasing collection of works of reference, comprising a number of the rarer books of the ancients, and an unusually full assortment of the garden herbals of the sixteenth, seventeenth,

and eighteenth centuries, and the leading monographs and manuals of modern times, supplemented by complete sets of a large number of the horticultural journals of Europe and America. The largest bound collection of seed, plant, and nursery catalogues in the United States is in the library of the department. This collection is very useful to students monographing horticultural plants. Students have access to an herbarium comprising about thirteen thousand cultivated plants.

The University campus affords an excellent collection of woody plants in mature condition, and an arboretum is rapidly being developed which exhibits all the useful plant forms in arrangement for type study and also in their grouping for various uses.

Graduate students who have been trained in general horticulture and who have not had specialized courses in Floriculture and Ornamental Horticulture may be required to take certain undergraduate courses. The following courses are required of all graduate students:

THE HISTORY AND LITERATURE OF ORNAMENTAL HORTICULTURE. Professor BEAL.

SEMINARY. Professor WHITE and staff.

FORESTRY

Professors R. S. HOSMER, S. N. SPRING, A. B. RECKNAGEL, JOHN BENTLEY, JR., C. H. GUISE, and J. N. SPAETH.

Students who wish to do graduate work in forestry, either for a Master's degree or for a Doctor's degree, are offered opportunity for advanced study or research in silviculture, forest management, forest policy, forest protection, and forest utilization.

Candidates for the Master's degree register for one major and one minor subject, and pursue either advanced study or research along these lines. This year is not devoted to undergraduate class work taken by graduate students, although in special cases a part of the student's time may be spent in such work.

Candidates for the degree of Master in Forestry must show adequate preparation in the following fundamental subjects or their equivalents: English, inorganic chemistry, solid geometry, trigonometry, plain and topographic surveying, introductory physics, dynamic geology, mineralogy, general botany, plant physiology, general biology, zoology, general entomology, economics. They must also have satisfactorily completed forestry courses the equivalent of those offered in the four-year undergraduate course of the Department of Forestry, New York State College of Agriculture, leading to the degree of Bachelor of Science. (See the Announcement of the New York State College of Agriculture at Cornell University.) In addition they must have had at least three months' experience in forestry work, satisfactory proof of which is to be a signed statement, or an examination in woodsmanship, or both. Students who enter as graduates without having had undergraduate instruction in forestry should be able to complete the work for the Master's degree in two years, if they have had satisfactory training in fundamental sciences. If they lack this, it will require a correspondingly longer time to get the Master's degree. Prospective students should write to the Department of Forestry for information regarding the special lines of graduate work which they desire to follow.

A student entering the Graduate School as a candidate for the degree of Master in Forestry should enter at the beginning of the first (autumn) term. Otherwise it will be difficult to arrange his work satisfactorily. It may often be advisable that such students attend the forestry summer camp.

Advanced Work and Research

Advanced work and research may be done in the following sub-fields:

*SILVICULTURE. Professor SPRING, Professor BENTLEY, and Professor SPAETH.

*FOREST MANAGEMENT. Professor RECKNAGEL, Professor BENTLEY, and Professor GUISE.

*Forest Policy. Professor Hosmer.

*Forest Protection. Professor Hosmer.

*Forest Utilization. Professor Recknagel, Professor Bentley, and Professor Guise.

Graduate Courses

Advanced Forest Management. Professors Recknagel and Guise. This course covers advanced work in organizing a forest property for management. An important part is the critical study of working plans. The course includes advanced work in forest finance.

Forest Administration. Professor Recknagel. The administrative organization and business practice in Federal, State, and private forestry.

Seminary. Field and classroom conferences on important phases of forestry. Conducted by members of the forestry staff.

*Pomology

Professors A. J. Heinicke, L. H. MacDaniels, D. B. Carrick, G. W. Peck, and Joseph Oskamp.

The large experimental and varietal orchards of different fruits at Ithaca and at Geneva are available for graduate use. Representative varieties of all domesticated species that grow in this climate may be found in these orchards. Each year a large collection of exotic fruit is brought together at the College; herbarium and preserved material is also available. Modern apparatus for research work on pomological problems involving chemical, histological, and physiological technique is available in the departmental laboratories. Special opportunity for investigation of fruit storage problems is afforded by a modern cold storage plant which is equipped for experimental purposes. The important pomological literature required for research is found in the libraries at Cornell and at the State Station.

In order to enter upon graduate work in Pomology, the student should have the equivalent of the following courses: General Botany, Elementary Plant Physiology, Economic Entomology, Elementary Plant Pathology, Introductory Inorganic and Elementary Organic Chemistry, Elementary Pomology and Systematic Pomology. In addition, students are required as part of their graduate work in Pomology to take advanced courses in Plant Physiology and Chemistry, unless minors are chosen in those subjects. They are urged, however, to choose a minor in some phase of Botany, particularly Plant Physiology.

On account of the nature of the work, it is very desirable that graduates studying for the Master's degree should spend one summer at Ithaca or in the field investigating their special subject. This is expected of graduates working for a Doctor's degree.

Economic Fruits of the World. Professor MacDaniels. A study of all species of fruit-bearing plants of economic importance not considered in previous courses, such as the date, the banana, citrus fruits, nut-bearing trees, and newly introduced fruits, with special reference to their cultural requirements in the United States and its insular possessions. Emphasis is placed on botanical relationships and fruit structure.

Advanced Pomology. Professor Heinicke. A systematic study of the sources of knowledge and opinion as to practices in pomology; methods and difficulties in experimental work in pomology, and results of experiments that have been concluded or are being conducted.

Research Problems in Pomology. Varietal and taxonomic, Professor MacDaniels; nutritional, Professor Heinicke; histological and morphological, Professor MacDaniels; winter injury of fruit tree tissues, and cold storage of fruits, Professor Carrick; various phases of general fruit culture, members of the staff.

Seminary. Members of the staff.

*Vegetable Gardening

Professors H. C. Thompson, Paul Work, E. V. Hardenburg, and H. W. Schneck.

Opportunity is offered for research in such lines of vegetable gardening as the student may select. There are excellent opportunities for original work in this subject.

The facilities available include the regular classrooms and laboratories; a small research laboratory with chemical equipment; greenhouse space of approximately 6,000 square feet; hot beds and cold frames and about fifteen acres of land devoted to research and teaching. Special equipment is secured as needed for students majoring in vegetable gardening.

In order to enter upon graduate work in vegetable gardening, the student should have the equivalent of the following courses: Botany 1 and 31, Plant Pathology 1, Entomology 12, Agronomy 1, Vegetable Gardening 1, 2 and 11. These courses are outlined in the Announcement of the College of Agriculture. In case a student has not had all of these courses he should take them early in his period of graduate study. Students taking either a major or a minor in vegetable gardening are required to take the course in Systematic Vegetable Crops and the course in Advanced Vegetable Gardening and to attend the seminar.

Students majoring in vegetable gardening will ordinarily find it necessary to spend one summer in Ithaca, in order to grow and study plant materials used in their research work.

Systematic Vegetable Crops. Professor Work. First term. This course deals with the taxonomy, origin, history, characteristics, and adaptation of kinds, varieties, and strains of vegetables. Attention is also devoted to identification, to classification, and to exhibition and judging. The leading varieties of the vegetable crops are grown each year. The value of the course consists, to a great extent, in gaining an actual acquaintance with the crops as they grow.

Advanced Vegetable Gardening. Professor Thompson or Professor Work. Second term. This course is devoted to a systematic study of the sources of knowledge and opinions as to practices in vegetable production and handling. Results of experiments that have been concluded or are being conducted are studied and their application to the solution of practical problems are discussed.

Seminary. Professors Thompson, Work, Hardenburg, and Schneck. Recent literature is taken up for general study and discussion. All graduate students in vegetable gardening are required to take part in this seminary.

Research. Members of the staff are prepared to direct investigations in the various lines of vegetable production and handling.

*Animal Husbandry

Professors H. H. Wing, M. W. Harper, E. S. Savage, L. A. Maynard, R. B. Hinman, and C. L. Allen.

Among the herds and flocks belonging to the College of Agriculture are a dairy herd of one hundred cows, a herd of beef cattle, studs of draft horses, a flock of about 150 sheep, and a herd of breeding swine. The equipment for animal husbandry includes a very full collection of the herd and flock registries of all the breeds of domestic animals kept in this country, amounting to more than one thousand volumes, and affording excellent facilities in heredity and genetics.

The animals of the herds and flocks provide opportunity for the study of problems in nutrition. A laboratory for small animals provides further opportunity for a study of the principles involved and a fully equipped chemical laboratory is available to graduate students. In order to undertake graduate work in animal nutrition the student should have had courses in physiology and biological chemistry, in addition to the elementary courses in the particular field in which he wishes to do his work.

No strictly graduate courses are offered in the Department of Animal Husbandry, but members of the staff are prepared to direct investigations in the following fields, and graduate students taking a major in Animal Husbandry

will be required to select a problem in some one or more of these fields: Animal Husbandry; Meat and Milk Production; Practice in Feeding and Stable Management; The Horse; Mechanics of the Horse; Advanced Stock Judging; Principles and Practice of Feeding; Principles of Animal Breeding; Practical Horse Training; Dairy Cattle; Beef Cattle, Sheep, and Swine.

Under certain conditions, minor subjects may be pursued in one or the other of the following courses:

For Graduates and Undergraduates

ADVANCED COURSE IN THE PRINCIPLES OF ANIMAL GENETICS. Professors WING AND HARPER.

ADVANCED COURSE IN THE PRINCIPLES OF ANIMAL NUTRITION. Professors MAYNARD and SAVAGE.

Primarily for Graduates

SEMINARY IN ANIMAL HUSBANDRY. Professor WING and other members of the staff. Attendance at the seminary is required of all graduate students taking either a major or a minor subject in the department.

SPECIAL TOPICS IN ANIMAL NUTRITION. Professor MAYNARD.

DAIRY INDUSTRY AND BACTERIOLOGY

Professors J. M. SHERMAN, H. E. ROSS, H. C. TROY, P. F. SHARP, E. S. GUTHRIE, A. T. HENRICI, T. J. MCINERNEY, and W. V. PRICE.

The laboratories of the department are well equipped for special work and offer excellent opportunities to graduate students for research.

Before taking up graduate work in bacteriology or dairy industry, it is desirable that a student have general chemistry, qualitative and quantitative analysis, organic chemistry, and general bacteriology, in addition to the elementary courses in the particular field in which he wishes to do his graduate work.

For detailed descriptions of the courses in bacteriology and dairy industry see the Announcement of the College of Agriculture.

Formal courses open to undergraduate and graduate students are given in the following subjects:

DAIRY INDUSTRY

For Undergraduates and Graduates

ANALYSIS AND CONTROL OF DAIRY PRODUCTS. Professors TROY and MCINERNEY.

MARKET MILK AND MILK INSPECTION. Professor ROSS.

MILK PRODUCTS. Professors GUTHRIE and PRICE.

DAIRY CHEMISTRY. Professor SHARP.

SEMINARY. Professor SHERMAN.

BACTERIOLOGY

For Undergraduates and Graduates

GENERAL BACTERIOLOGY. Professor SHERMAN.

ADVANCED GENERAL BACTERIOLOGY. Professor HENRICI.

DAIRY BACTERIOLOGY. Professor SHERMAN.

*DAIRY INDUSTRY

For Graduates

Graduate students may elect research problems in any of the various fields of dairy industry: the analysis of milk and its products; the sanitary production and control of market milk; the manufacture and technology of milk products; dairy chemistry.

*BACTERIOLOGY

For Graduates

Research problems may be selected in various phases of pure and applied bacteriology: taxonomy; physiology; technique; dairy bacteriology; food bacteriology; water and sanitary bacteriology; industrial fermentations. (For pathogenic bacteriology, see ANIMAL PATHOLOGY AND BACTERIOLOGY; for soil bacteriology, see AGRONOMY.)

*POULTRY HUSBANDRY

Professors J. E. RICE, G. F. HEUSER, H. E. BOTSFORD, L. C. NORRIS, C. K. POWELL, and G. O. HALL.

This department of study is well equipped with facilities for carrying on advanced work. The equipment includes special appliances and a flock of over 2,000 fowls with which to conduct investigations in feeding, breeding, housing, incubation and artificial illumination. Laboratories provide means for doing the anatomical and analytical work required in poultry experiments.

In addition to a very complete set of bulletins in the poultry library, assembled from the various experiment stations in the United States and Canada, numerous books on poultry husbandry are available in the University Library, the library of the College of Agriculture, and the special departmental library. The department is also provided with a topical card index, with cross references, of the principal poultry books, bulletins, and magazines; a large mass of data from research; 6,000 negatives, a large number of which have to do with poultry investigations; and more than 3,000 lantern slides.

The Poultry Husbandry Building and auxiliary buildings furnish facilities for graduate work along many lines of instruction and research. These buildings have been constructed at a cost of approximately $150,000, and include the administration building, laying pens, the fattening house, breed exhibition house, and long brooder house. Over forty varieties of poultry are kept for class use, and facilities are now available for the study of the adaptation of the various breeds, feeds, equipments, methods, etc., to the needs of the various locations and types of poultry farming.

Owing to the fact that many colleges do not give the undergraduate courses in poultry husbandry which are prerequisite to graduate work in the subject, students coming from other institutions cannot in all cases enter immediately upon graduate study. Many students will find it necessary or desirable to spend a year in preliminary study taking undergraduate courses before beginning graduate work. The preliminary courses include Farm Poultry; Poultry Feeds and Feeding; Poultry Incubation and Brooding; the Breeds of Poultry and Judging; Poultry Breeding; Poultry House Design and Construction; Marketing Poultry Products; Poultry Farm Management; the Field of Poultry Husbandry.

Instruction of an advanced nature and investigation may be taken along the lines of poultry feeding, illumination, and poultry farm management, house construction and management; in co-operation with the Staff of the Veterinary College, in poultry disease investigations; and in co-operation with the staff in histology and embryology, in incubation experiments.

Primarily for Graduates

SEMINARY. Professors RICE, HEUSER, and BOTSFORD; Assistant Professors NORRIS, POWELL, and HALL.

RESEARCH. Professors RICE, HEUSER, and BOTSFORD; Assistant Professors NORRIS, POWELL, and HALL.

The New York State Agricultural Experiment Station at Geneva

Professors R. W. Thatcher, U. P. Hedrick, R. J. Anderson, A. Berger, R. S. Breed, D. C. Carpenter, R. C. Collison, H. J. Conn, A. C. Dahlberg, H. Glasgow, G. J. Hucker, L. K. Jones, M. T. Munn, P. J. Parrott, W. H. Rankin, F. C. Stewart, L. L. Van Slyke, Richard Wellington.

Since July 1, 1923, the State Agricultural Experiment Station at Geneva has been under the administration of Cornell University, the research workers of its staff are eligible to membership on the faculty of the Graduate School, and its facilities for research are available to graduate students.

The Station has a farm of approximately two hundred acres which is used almost exclusively for field experimental work with fruit and vegetable crops and certain special soil studies. It has laboratory buildings devoted exclusively to research in agricultural bacteriology, agricultural chemistry, agronomy, agricultural botany, dairying, economic entomology, horticulture, and poultry raising. It has also a research reference library, permanent exhibits and records of progress of its research, suitable conference rooms, and adequate facilities for publication and distribution of results of station work.

Certain phases of the investigations now being conducted at the Station and other problems for which the facilities of the Station are suitable may be used as thesis problems by graduate students.

There is opportunity at the Station for graduate research in the following lines, under the direction of members of the staff as indicated:

AGRICULTURAL BACTERIOLOGY

Dairy Bacteriology. Professors Breed and Hucker.
Soil Bacteriology. Professor Conn.
Biological Stains. Professor Conn.

AGRICULTURAL CHEMISTRY

Chemistry of Milk and its Products. Professors Van Slyke and Carpenter.
Chemistry of Plant Tissues. Professors Thatcher and Anderson.
Chemistry of Insecticides and Fungicides. Professor Thatcher.

AGRONOMY

Plant Nutrition. Professor Collison.
Plant Toxins. Professor Collison.

AGRICULTURAL BOTANY

Plant Diseases. Professors Stewart, Rankin, and Jones.
Seed Control and Improvement. Professor Munn.

DAIRYING

Dairy Products. Professor Dahlberg.

ECONOMIC ENTOMOLOGY

Orchard Insects. Professors Parrott and Glasgow.
Canning Crops Insects. Professor Glasgow.

HORTICULTURE

Genetics of Fruit Breeding. Professors Hedrick and Wellington.
Fruit Propagation and Management. Professor Hedrick.
Systematic Botany of Horticultural Plants. Professor Berger.

THE MEDICAL SCIENCES

As Presented in the Medical College in New York City

For a full description of the work in the Medical College in Ithaca and in New York City, see the Announcement of the Medical College. Students desiring to enter the Graduate School for work in the medical sciences can obtain application blanks at the office of the Dean of the Medical College. Professor C. R. Stockard, Chairman of the Group, may be consulted for additional information.

The Medical College in New York City comprises the main building on First Avenue opposite Bellevue Hospital and the adjacent Loomis Laboratory on Twenty-sixth Street.

The Main Building occupies the entire block between Twenty-seventh and Twenty-eighth Streets, on First Avenue, extending back one hundred feet, thus affording an available space of nearly 20,000 square feet on each of its seven floors. The Department of Anatomy occupies the entire fifth floor. In addition to a commodious and well lighted dissecting room there are numerous smaller rooms for investigation and research in anatomy, histology and embryology, preparation rooms, storage rooms, etc. The fourth floor is devoted entirely to pathology, bacteriology, and the College Library. There are several rooms for investigators and assistants, preparation rooms, classrooms, a teaching museum, and a library containing current numbers and many back files of the important journals devoted to medical sciences, in English, French, and German. The facilities offered by the departmental libraries in the medical school are readily amplified by use of the various libraries in New York City, several of which are within easy reach of the college buildings. Among these the library of the New York Academy of Medicine, the second largest medical library in the country, is worthy of special mention. The departments of Physiology and Chemistry occupy the third floor of the Main Building and are equipped with laboratories devoted to the problems of research, in addition to those used by students in the course leading to the M. D. degree. Organic chemistry, physiological chemistry, and chemical pathology are thus especially provided for. One large room is set aside for calorimetry and another has been equipped as an operating room in connection with the work in experimental physiology. The lower floors of the Main Building contain the college offices, the dispensary, lecture rooms, classrooms, and a power plant.

The Loomis Laboratory, besides the pharmacological laboratories for medical students, contains laboratories for research on bacteriology, hygiene, physiological chemistry, experimental medicine, and pharmacology. Facilities are thus furnished to graduates who may desire to pursue further study or research in the various departments of laboratory investigation. The second floor of this laboratory is devoted entirely to pharmacology and its allied sciences; the first and third floors provide accommodations for the Department of Experimental Medicine with research laboratories for physiological chemistry and chemical pathology. The fourth and fifth floors are devoted to research in pathology, bacteriology, hygiene, serology, and immunology; they also provide ample accommodations for photomicrography.

Bellevue Hospital, whose gates open directly opposite the college buildings, furnishes ample opportunity for extending the problems of the laboratory to the bedside, besides offering many intricate problems for solution in the laboratory. The Hospital is organized in four divisions, one of which has, by the Trustees of the Hospital, been placed at the disposal of the Faculty of the Cornell University Medical College for medical research and instruction. The services thus intrusted to the College include, continuously, ninety medical beds, ninety surgical beds, sixty beds to genito-urinary diseases, a neurological service, and, for one-half the year, fifty-four obstetrical beds. Moreover, the College has general privileges in the other divisions, which afford it continuous opportunity for instruction and research in the wards devoted to the treatment of alcoholic diseases, tuberculosis, gynecology, and the psychopathic diseases.

New York Hospital. The Medical College, through the courtesy of the Governors of the New York Hospital, had long been accorded certain privileges

for instruction in its wards, but on the 1st of January, 1913, a definite arrangement was established between Cornell University and the New York Hospital, through the donation to the hospital of a generous fund which was presented by Mr. George F. Baker, one of the governors of the hospital, upon the condition that thereafter half the entire medical, surgical, and pathological services of the institution should be definitely assigned to the Cornell University Medical College for the advancement of its teaching and research. By this most advantageous arrangement the University nominates the visiting staff and laboratory staff of its division and secures the admission of its students to the wards as clinical clerks, which enables the college to make a definite provision in its courses of instruction and research for work in the New York Hospital, and this is now closely correlated in the curriculum with the similar work which had hitherto been done in Bellevue Hospital. Furthermore, the laboratory staffs of the different departments of the Medical College are placed at the service of the hospital for the purposes of extending its scientific works. The hospital service thus assigned to the college comprises 100 beds. This service is exceedingly active. It includes several thousand acute and emergency cases brought in annually from a large ambulance and dispensary district. The services thus supplied to the College are ample for advanced research as well as for undergraduate instruction.

Memorial Hospital. Through the generosity of the late Dr. James Douglas, who gave this Hospital an endowment for the study and treatment of cancer and allied diseases, the Memorial Hospital became affiliated in 1914 with the Cornell University Medical College. The conditions under which this union was consummated place upon Cornell University Medical College the responsibility for the medical and surgical activities of the Hospital, subject however, so far as administrative action is concerned, to the approval of its Board of Managers. The Cornell University Medical College is required to approve the five medical members of the Board of Managers of the Memorial Hospital and to nominate their successors in case of vacancies, and to name the medical and surgical staff, subject to the approval of the Board of Managers of the Hospital.

The John E. Berwind Maternity Clinic. An affiliation having been consummated between the John E. Berwind Maternity Clinic and Cornell University Medical College, the medical direction of the clinic is placed under the control of Cornell. The medical staff, including the resident and house staffs, are appointed by the clinic only on nomination by the Medical College. Cornell students are definitely assigned to the clinic for practical instruction under the direction of the Professor of Obstetrics. Cornell students having been provided for, vacancies in the student staff are filled by appointment. Application for such assignments should be made to the Superintendent of the Clinic at 125 East 103rd Street, New York City.

The Russell Sage Institute of Pathology. The Russell Sage Institute of Pathology has been affiliated with the Second Medical (Cornell) Division of Bellevue Hospital since 1913. Endowed by Mrs. Russell Sage in 1907, it has provided funds for research work in pathology and medicine. Laboratory space has been generously given by the trustees of Bellevue Hospital and clinical facilities have been furnished by the Cornell Medical Division. The Institute has constructed and equipped a respiration calorimeter and has maintained a metabolism ward adjacent to the general wards of the division. The research workers have been members of the hospital staff and have assisted in the care of patients and the instruction of students. The metabolism ward, chemical laboratories, and calorimeter furnish unusual facilities for teaching the diseases of metabolism.

*Anatomy

Professors C. R. Stockard, R. Chambers, jr., C. V. Morrill, and G. Papanicolaou.

Abundant material and sufficient apparatus are available for advanced study and work in the various branches of anatomy, embryology, histology, comparative morphology, descriptive anatomy, and experimental anatomy. Students desiring to pursue graduate work in any of these branches must have had in their

college courses preliminary training in general zoology and comparative anatomy. A reading knowledge of German and French is essential.

New York City offers exceptional advantages for obtaining fresh human material. The large slaughter-houses are accessible for comparative mammalian tissues and organs. The extensive collections of specimens and models in the city museums are extremely helpful and instructive to the advanced student.

The members of the staff offer courses in the various phases of anatomy in which they are especially engaged. The courses offered for the medical students appear in the Announcement of the Medical College, and are particularly recommended to those students who have not pursued work of this kind. Technical and practical anatomical work are fully provided.

Preliminary Requirements: Physics, Chemistry, and Biology as required for admission to the Medical College.

MORPHOLOGY, EMBRYOLOGY, HISTOLOGICAL TECHNIC, GENERAL HISTOLOGY, MICROSCOPIC ANATOMY AND ORGANOLOGY, DESCRIPTIVE ANATOMY, including courses in dissection of the human body, DEMONSTRATIONS ON THE CADAVER, LIVE ANATOMY, TOPOGRAPHICAL ANATOMY, NEURO-ANATOMY AND NEURO-HISTOLOGY, APPLIED ANATOMY, ORGANS OF SPECIAL SENSE, ANATOMICAL RESEARCH.

ANATOMY OF THE LIVING BODY. Associate Professor MORRILL.

SPECIAL AND TOPOGRAPHICAL STUDIES OF DIFFERENT REGIONS. Professors STOCKARD and MORRILL.

HUMAN HISTOLOGY AND HISTOGENESIS. Professor CHAMBERS and Dr. NONIDEZ.

EXPERIMENTAL MORPHOLOGY. Professor STOCKARD.

ANATOMY OF THE INFANT AND POSTNATAL DEVELOPMENT. Professor STOCKARD.

*PHYSIOLOGY

Professors GRAHAM LUSK and D. J. EDWARDS; *Doctors* H. J. DEUEL and MCKEEN CATTELL.

Students desiring to elect physiology as a major course, in addition to completing the course in general physiology given to medical students, will be required to undertake some special problems, preferably dealing with aspects of nutrition or circulation. Students electing physiology as a minor course may select either the work in general physiology given to medical students or may select only a portion of this course (e.g., nutrition, circulation, etc.) provided an additional amount of special work in these subjects is undertaken.

A preliminary knowledge of chemistry—analytical, organic, and physiological—as well as of physics, is requisite for those who select physiology as a major.

GENERAL PHYSIOLOGY. Comprising nerve muscle physiology, central nervous system, special senses, respiration, circulation, secretion, digestion, metabolism.

PHYSIOLOGY OF NUTRITION. Professor LUSK, Dr. DEUEL.

PHYSIOLOGY OF CIRCULATION. Professor EDWARDS.

PHYSIOLOGY OF MUSCLE AND NERVE. Dr. CATTELL.

*PHYSIOLOGICAL CHEMISTRY AND CHEMICAL PATHOLOGY

Professor S. R. BENEDICT.

The laboratories available for advanced work and research in physiological chemistry and chemical pathology include those of the Department of Chemistry, in the Main Building, and a research laboratory in the General Memorial Hospital. These laboratories provide adequate equipment for investigation in a great variety of special problems in the chemistry of the plant, animal, or human organism in health or disease, by chemical, physical, or optical methods. In the college library the principal journals relating to these subjects are on file.

Students expecting to pursue investigation in physiological chemistry or chemical pathology should have adequate preliminary training in inorganic, analytical, and organic chemistry, as well as in physics, physiology, and physical chemistry, though a study of these latter subjects could be pursued at the College, together with more advanced work in special lines.

ORGANIC AND PHYSIOLOGICAL CHEMISTRY: RESEARCH.

PHYSIOLOGICAL CHEMISTRY.

CHEMICAL PATHOLOGY.

*PATHOLOGY, BACTERIOLOGY, AND HYGIENE

Professors JAMES EWING, W. J. ELSER, O. H. SCHULTZE, J. C. TORREY, E. S. L'ESPERANCE, and A. F. COCA, and *Doctor* M. C. KAHN.

The laboratories of pathology, bacteriology, and hygiene occupy the fourth floor of the main building and the third and fourth floors of the Loomis Laboratory. The equipment includes all the means commonly employed in research in these fields and much new and original apparatus. These laboratories are provided with suitable quarters for the care of animals. The library includes about 8,000 bound volumes and a large and valuable collection of monographs and reprints. There is an extensive collection of specimens illustrating pathological histology, much material for histological study, and a museum containing about 3,000 specimens. The recent material from the autopsies at several hospitals is constantly available for study, and furnishes a supply of problems in many fields, which is practically inexhaustible. Applicants who have been admitted to the Graduate School are urged to present the degree of Doctor of Medicine for admission to these courses.

Preliminary requirements: Anatomy, including Histology and Embryology.

GENERAL PATHOLOGY, SPECIAL PATHOLOGY, PATHOLOGICAL ANATOMY, MEDICO-LEGAL PATHOLOGY, AUTOPSY TECHNICS, EXPERIMENTAL PATHOLOGY, BACTERIOLOGY, IMMUNOLOGY, HYGIENE and PREVENTIVE MEDICINE.

*PHARMACOLOGY

Professor R. A. HATCHER.

The laboratory of pharmacology in the Loomis Laboratory is well equipped for general work and research in pharmacology and special opportunities will be afforded for doing work involving the action of drugs on the circulatory system and methods of biological testing of drugs and medicines, either supplementing or replacing chemical tests for activity and identity.

The departmental library is sufficient for the immediate needs of workers and its facilities are readily amplified by the College, and other libraries nearby, which furnish every opportunity for extending the work.

A knowledge of chemistry and physiology is required.

MATERIA MEDICA and PHARMACY; PHARMACOLOGY.

RESEARCH IN THE PHARMACODYNAMICS OF DRUGS.

TOXICOLOGY.

FELLOWS: SCHOLARS: ROSTER OF DEGREES

FELLOWS AND GRADUATE SCHOLARS IN 1925–26

HONORARY FELLOWS

Edith Ayres Copeland, A.B. (Wellesley) 1914, A.M. (Wellesley) 1916, Ph.D. (Chicago) 1921.
James Craik, A.M. (St. Andrews) 1920, B.Sc. (St. Andrews) 1921, Ph.D. (St. Andrews) 1924.
Charles Alexius Dickinson, A.M. (Clark) 1922, Ph.D. (Clark) 1925.

RESIDENT DOCTORS

Abel Charles Gurchot, B.S. (College of the City of New York), 1921, Ph.D. (Cornell) 1925.
Harriet Martin Libby, A.B. (Adelphi) 1902, A.M. (Cornell) 1905, Ph.D. (Cornell) 1910.
Kurt Friedrich Georg Maiwald, Ph.D. (Breslau) 1924.
Elsie Murray, A.B. (Cornell) 1904, Ph.D. (Cornell) 1907.
Friedrich Maximilian Schmidt-Ernsthausen, Ph.D. (Heidelberg) 1924.
Hans Joachim Seidel, Doktor rerum pol. (Berlin) 1925.
Stepan Soudek, Ph.D. (Prague) 1920.
Louis John Stadler, B.S. in Agr. (Florida) 1917, A.M. (Missouri) 1918, Ph.D. (Missouri) 1922.
Alois Tavcar, Ph.D. (Prague) 1923.
Roxanna Vivian, A. B. (Wellesley) 1894, Ph.D. (Pennsylvania) 1901.
Johann A. von Monroy, Ph.D. (Eberswalde) 1924.

UNIVERSITY FELLOWS

The Sage Fellowship in Chemistry: Ludwig Frederick Audrieth, B.S. (Colgate) 1922.
The Schuyler Fellowship in Animal Biology: Magel Craig Wilder, A.B. (Brown) 1919, A.M. (Brown) 1921.
The Goldwin Smith Fellowship in Geology: Fred Robert Neumann, B.S. (Chicago) 1921, M.S. (Chicago) 1923.
The President White Fellowship in Physics: Deane Brewster Judd, A.B. (Ohio State) 1922, A.M. (Ohio State) 1923.
The University Fellowship in Agriculture: Oliver Ray Johnson, B.S. in Agr. (Missouri) 1910.
The President White Fellowship in Political and Social Science: Arnold John Zurcher, A.B. (Oberlin) 1924.
The Fellowships in Political Economy: Wilson Lewis Farman, A.B. (Cornell) 1925; Stephen Mansfield Jaquith, A.B. (Cornell) 1925; John Highberger Patterson, A.B. (Cornell) 1925.
The Fellowship in Greek and Latin: Caro Lynn, A.B. (Tarkio) 1895, A.M. (Colorado) 1904.
The Boldt Fellowship in History: Frederick George Marcham, A.B. (Oxford) 1923.
The Fellowship in American History: Elizabeth Marie Becker, B.S. (Northwestern) 1922, A.M. (Northwestern) 1923.
The Susan Linn Sage Fellowships in Philosophy: John Reginald Cresswell, A.B. (McMasters) 1923; Stephen Albert Emery, A.B. (Cornell) 1923.
The Cornell Fellowship in English: Richard Beck, A.B. (Reykjavik) 1920, A.M. (Cornell) 1924.
The University Fellowship in German: Ernest Kubler, A.B. (Dijon) 1923.
The University Fellowship in Architecture: Thomas Jefferson Baird, B.Arch. (Cornell) 1925.
The Edgar J. Meyer Memorial Fellowship in Engineering Research and the Sibley Fellowship in Mechanical and Electrical Engineering: Robert Parker Mason, M.E. (Cornell) 1925.
The McGraw Fellowship in Civil Engineering: Shu-t'ien Li, B.S.C.E. (Pei-Yang) 1923.

SPECIAL TEMPORARY FELLOWS

The American Agriculturist Fellowship: Fred Fouse Lininger, B.S. in Agr. (Pennsylvania State) 1917, M.S. (Cornell) 1926.

The Palmolive Fellowship in Chemistry: George Paul Vincent, A.B. (Hiram) 1923, M.S. (Cornell) 1924.

The Champlain Valley Fellowship in Plant Pathology: Arthur Brotherton Burrell, B.S. in Agr. (Ohio State) 1924.

The Potash Importing Corporation Fellowship: Edmund Ellsworth Vial, B.S. (Illinois)1922, M.S. (Cornell) 1924.

The Grasselli Fellowship in Chemistry: Harold Talbot Lacey, B.Chem. (Cornell) 1921.

The Du Pont Fellowship in Chemistry: Christopher John Welz, Chem.E. (Rensselaer Polytechnic) 1920, M.S. (Cornell) 1924.

The Herman Frasch Fellowship in Plant Pathology: Harry Elihu Newland, B.S. (Purdue) 1924.

The Williamson Valley Co-operative Vegetable Association Fellowship: John Gordon Gaines, B.Sc. (Clemson) 1922.

GRADUATE SCHOLARS

The Susan Linn Sage Graduate Scholarships in Philosophy: Vera Elizabeth Flory, A.B. (Northwestern) 1923, A.M. (Northwestern) 1924; Walter Dilman Gotshalk, A.B. (Princeton) 1922; Alston Scott Householder, B.S. (Northwestern) 1925; Asher Grant Stewart, Ph.B. (Ripon) 1924; Robert Lloyd Beck, A.B. (Wake Forest) 1924.

The Susan Linn Sage Graduate Scholarships in Psychology: Lillian Maynard Hatfield, A.B. (Lake Forest) 1923, A.M. (Illinois) 1924; Merrick Kershaw Walsh, A.B. (South Carolina) 1924, A.M. (South Carolina) 1925; Hanson Durham Powers, A.B. (Wake Forest) 1920.

The Graduate Scholarships in Mathematics: Edward Aaron Saibel, B.S. (Massachusetts Inst. of Technology) 1924; Florence Marie Mears, A.B. (Goucher) 1917, A.M. (Cornell) 1924; Hazel Edith Schoonmaker, A.B. (Wellesley) 1911, A.M. (Radcliffe) 1914.

The Graduate Scholarship in Chemistry: Katharina Marjorie Tressler, A.B. (Cornell) 1918.

The Graduate Scholarship in Civil Engineering: Philip Charles Stein, C.E. (Cornell) 1925.

The Graduate Scholarship in Latin and Greek: Joseph Theodore Schultz, A.B. (Cornell) 1925.

The Graduate Scholarship in Archaeology and Comparative Philology: James William Pugsley, A.B. (Cornell) 1925.

The Graduate Scholarship in Animal Biology: Helen Reed, B.S. (Bucknell) 1920.

The Graduate Scholarship in Geology: W. Storrs Cole, B.S. (Cornell) 1925.

The Graduate Scholarship in English: Edward Gay Ainsworth, A.B. (Cornell) 1925.

The Graduate Scholarship in History: Joseph Ruttenberg, A.B. (Cornell) 1923, A.M. (Cornell) 1924.

The Graduate Scholarship in Architecture: Douglass Vincent Freret, B.Arch. (Tulane University of Louisiana) 1925.

The Graduate Scholarship in Botany: Minna Frotscher Koch, A.B. (Newcomb) 1916.

The Gage Scholarship in Physics: Mabel Kathaleen Slattery, A.B. (Vassar) 1925.

ADVANCED DEGREES CONFERRED IN 1924–25

MASTERS OF ARTS

Conferred September 27, 1924

Francis Niles Bacon, A.B.: Latin, Education. Thesis: *Augustus as a God in the Poetry of the Augustan Age.*

Sarah Lucile Burriss, A.B.: Nineteenth Century Fiction, American Literature. Thesis: *The Fiction of Thomas Hardy.*

Bertha Lucretia Carroll, B.A.: Victorian Literature, American Literature. Thesis: *Browning's Use of Historical Material.*

Psyche Cattell: Education, Statistics. Thesis: *School Standing and Physical Traits.*

Huan Lo, A.B.: Education, Government. Thesis: *Reorganizing the Administrative System of Education in China.*

Helen Zuck Loring, B.A.: English Elizabethan Literature, English Language. Thesis: *"Nobody and Somebody," edited with Introduction and Notes.*

Albert Clayton Lyles, A.B.: Inorganic Chemistry, Industrial Chemistry. Thesis: *The Electrolysis of Selenic Acid and Selenates.*

Desmond Stevens Powell, A.B.: English Literature, Education. Thesis: *Shelley and Byron.*

Eulalie Alberta Richardson, A.B.: English Drama, English Language. Thesis: *"Appius and Virginia," a Tragedy by John Webster, with Introduction and Notes.*

Elroy Franklin Sheldon, A.B.: Embryology and Histology, Physiology. Thesis: *Nature of the So-called Hibernating Gland in Mammals.*

Mattie Ellen Wright, A.B.: French Literature, German Literature. Thesis: *The Poetry of Francis Jammes.*

Conferred February 4, 1925

Barbara McClintock, B.S.: Cytology, Genetics. Thesis: *A Resumé of Cytological Investigations of the Cereals with Particular Reference to Wheat.*

Vera Louise Peacock, A.B.: French, Education. Thesis: *The Dramatic Works of Paul Claudel.*

Charles McKinley Ramsey, B.S.: Economic Theory, Finance. Thesis: *The British Pound since 1914. A Consideration of Some of the Factors Involved in the Course of Sterling Exchange in the Periods 1914–1923.*

Amy Elizabeth Williams, A.B.: English History, American History. Thesis: *The Speaker of the House of Commons, 1603–1629.*

Conferred June 15, 1925

Jeannette Alexander, B.A.: French, Latin. Thesis: *Personal Element of Beyle's Works.*

Hope Evangeline Anderson, A.B.: Histology and Embryology, Pathology and Bacteriology. Thesis: *The Lymphatic Tissue of the Gastric Mucosa.*

Lucy Elizabeth Berger, B.A.: Mathematics, Mathematics. Thesis: *A Topological Study of Certian Plane Algebraic Curves.*

Pearl Sydenstricker Buck, A.B.: English, Education. Thesis: *The Personal Essay.*

Frances Holland Burns, B.A.: Anatomy, Physiology. Thesis: *Lobes and Fissures of the Human Lung—A Study of 100 Adult and 30 Foetal Specimens.*

Coolidge Otis Chapman, A.B.: English, History. Thesis: *The Diction of the Middle English Purity.*

Frederick Carl Christensen, M.D.: Pathology, Chemistry. Thesis: *The Location, Age and Sex Incidence of 1000 Cases of Bone Tumors.*

Henry Francis Cook, A.B.: Nineteenth Century Literature, Elizabethan Literature. Thesis: *Joseph Conrad, A Study of His Novels and Biographical Books.*

Hugh Oliver Cook, A.B.: Education, Public Speaking. Thesis: *A Modern High School Plant for the Negro Children of Kansas City, Mo.*

Helen Sophie Davis, A.B.: English Drama, Elizabethan Literature. Thesis: *Characteristics of the English Comedy of the First Half of the Nineteenth Century.*
Irving Antony Derbigny, A.B.: Analytical Chemistry, Industrial Chemistry. Thesis: *The Reduction of Nitrous Oxide.*
Edith Anna Farnham, A.B.: English History, American History. Thesis: *The Career of Sir Robert Phelips in the Parliament of 1621.*
Wallace Klippert Ferguson, B.A.: Medieval History, Modern European History. Thesis: *Bancal Des Issarts Publicist of the Gironde.*
Valleria Belt Grannis, A.B.: French, English. Thesis: *Critical Estimates of Stendhal.*
Mary Blakesley Griswold, B.A.: English Literature, Middle English. Thesis: *The Poetics of Aristotle and the Iliad of Homer.*
Mardiros Epipan Hekimian, C.E.: Mathematics, Physics. Thesis: *A Representation of a Function of Several Variables by a Finite Number of Powers with Continuous Coefficients.*
Henry Alfred Hoover, B.S.: Geometry, Analysis. Thesis: *Resolution of Singularities on a Proper Sextic Curve.*
Edwin Johnston Howard, A.B.: English Literature, English Language. Thesis: *An Art of Poetry.*
Linda Grace Hoyer, A.B.: Literary Criticism, Elizabethan Literature. Thesis: *A Study of the Bride of Lammermoor.*
James Hutton, A.B.: Classics, English. Thesis: *The Greek Anthology in England.*
Helen Keane, B.A.: Public Speaking, Literary Criticism. Thesis: *Study and Practice in Quintilian's Theory of Oratorical Training.*
Zung-Nyi Loh, B.A.: Physics, Mathematics. Thesis: *The Effect of Temperature on the Absorption of Fluorescein.*
Mary Anna McCrea, A.B.: Sociology, Labor Problems. Thesis: *Hiring Problems and Methods.*
Edwin Nungezer, B.S.: Elizabethan Literature, Old and Middle English. Thesis: *Dedications of Plays.*
Mary Graydon Payne, A.B.: Histology and Embryology, Physiology. Thesis: *The Vascular Channels of Costal Cartilage in Different Mammalian Forms: A Comparative Study to Determine their Significance and Extent.*
Matthew Corell Pugsley, A.B.: Anatomy, Bacteriology and Pathology. Thesis: *The Notches and Fissures of the Human Spleen.*
Leo Bogan Roberts, A.B.: Inorganic Chemistry, Sanitary Chemistry. Thesis: *Alkalinity of Blue Rock Salt.*
Julia Elizabeth Rothermel, A.B.: Embryology and Histology, Zoology. Thesis: *The Erythropoietic Activity of the Spleen in the Cat.*
Jason Almus Russell, A.B.: English, Education. Thesis: *Ruskin the Educator.*
Ruth Nimmo St. John, A.B.: Economic Geology, Physical Geography. Thesis: *Some Studies on the Methods of Fossilization of Plant Tissue.*
Margaret Louise Tallmadge, A.B.: Latin, Ancient History. Thesis: *Certain Difficult Passages in the Brutus of Cicero.*
Benjamine Tokuo Tsunajima, A.B.: Physical Chemistry, Optical Chemistry. Thesis: *On the Stability of Foam.*
Lelia Evelyn Tupper, A.B.: English Literature, English Language. Thesis: *The Cunning Lovers.*
Max Wainger, A.B.: English, History. Thesis: *The Life and Works of Henry Sweet.*
Catherine Margaret Welch, A.B.: French, Spanish. Thesis: *The Aspects of Romanticism and Realism in Stendhal.*
Elizabeth Dorothy Worman, A.B.: English, Public Speaking. Thesis: *The Authorship of The Merry Devil of Edmonton.*

MASTERS OF SCIENCE

CONFERRED SEPTEMBER 27, 1924

Stewart Rochester Cooper, B.S.: Chemistry, Inorganic Chemistry. Thesis: *The Use of Dinitroso-Resorcinol as a Reagent for the Detection of Cobalt, Iron, and Copper.*

Irene Dorothy Dobrosky, B.S.: Entomology, Bacteriology. Thesis: *A Study of the External Parasites of Nestling Robins and the Fauna of the Nest throughout the Year.*

Elizabeth Racao Durfee, B.S.: Experimental Physics, Theoretical Physics. Thesis: *A Study of the Transmission and Reflection of Light by Ancient Glass.*

Richard Cornelius Fisher, B.A., B.S.A.: Dairy Industry, Agricultural Chemistry. Thesis: *Influence of Transportation upon the Bacterial Content and Temperature of Milk under Summer Conditions.*

Kenneth Price Geohegan, A.B.: Optical Chemistry, Physical Chemistry. Thesis: *The Microscopic Identification of Paper Fillers.*

William Carroll Hollis, B.S.: Dairy Industry, Accounting. Thesis: *An Accounting System for a Small Ice Cream Plant.*

James Edward Knott, B.S.: Plant Physiology, Vegetable Gardening. Thesis: *The Effect of Certain Treatments of Seed before and during Germination on the Subsequent Growth and Yield of some Vegetable Crops.*

Jack Miscall, B.S.: Agricultural Chemistry, Physical Chemistry. Thesis: *Relation between Refractive Index and Composition of Solutions with Particular Reference to Condensed Milk.*

Elmer C. Nash, B.S.: Rural Education, Agricultural Economics: Thesis. *A Study of the Resources for the Vocational Guidance of the Boys of Dryden School Community.*

John Victor Nevitt, B.S., D.V.M.: Veterinary Surgery, Animal Husbandry. Thesis: *Important Hernias of Domestic Animals.*

Ola Dot Overbey, B.S.: Poultry Husbandry, Rural Social Organization. Thesis: *The Distribution of Egg Production as an Indication of the Laying Capacity of Fowls.*

Mooljibhai Shivabhai Patel, B.S.: Organic Chemistry, Industrial Chemistry. Thesis: *Orthocresol tetrachlorophthalein and Some of its Derivatives.*

Bryan Berry Paul, B.Chem.E.: Industrial Chemistry, Industrial Engineering. Thesis: *The Viscosities of Mixtures of Nitric Acid, Sulphuric Acid and Water.*

Dora Carmena Perry, A.B.: Rural Education, Rural Sociology. Thesis: *The Place of Home and School Co-operative Organizations in the Attainment of Rural School Objectives.*

Paul Smith Prickett, B.S.: Sanitary Chemistry, Bacteriology. Thesis: *Studies on Agar-Agar.*

Belle Katherine Stewart, A.B.: Botany, Physical Geography. Thesis: *The Vascular Anatomy of the Flower of the Phryma.*

George Paul Vincent, A.B.: Physical Chemistry, Industrial Chemistry. Thesis: *Corrosion in Dichromate Solutions.*

George Willever Walton, Ph.B.: Zoology, Botany. Thesis: *The Alimentary Canal of the Larva of Tipula Abdominalis.*

Christopher John Welz, Chem.E.: Physical Chemistry, Industrial Chemistry. Thesis: *The Electrodeposition of the Alloy Cupro-Nickel.*

Chia Teh Yu, B.S.: Rural Education, Rural Social Organization. Thesis: *A Study of Special State Aid to Rural Schools in Minnesota.*

CONFERRED FEBRUARY 4, 1925

Claire Cole Fisher, B.S. in M.E.; Water Power Engineering, Geology. Thesis *An Investigation of Water Hammer.*

George Eric Peabody, B.S.: Rural Social Organization, Rural Economy. Thesis: *The Rural Community Building.*

Ernest Guy Robinson, B.S.: Stratigraphy, Physical Geography. Thesis: *A Correlation of the Mesozoic Strata of Southwestern Alberta and Montana.*

Yen Chiao Tao, B.S.: Agricultural Chemistry, Dairy Industry. Thesis: *The Chemistry of the Rice Extract.*

Francis Gwinnett Constans Tooke, B.S.: Economic Entomology, Morphological Entomology. Thesis: *A Biological Study of the White Pine Aphid, Chermes Pinicorticis, and a Study of Calcium Arsenate as an Insecticide.*

Cornelius Janse Uys, B.S.: Agricultural Economics, Animal Husbandry. Thesis: *The Consumer's Demand for Meat as Related to the Meat Market Problem*

CONFERRED JUNE 15, 1925

Livingston Stanley Boyer, B.S.: Soil Technology, Physical Chemistry. Thesis: *Effect of Partial Deficiencies on Nutrient Growth.*

John Lossing Buck, B.S.: Farm Management, Rural Social Organization. Thesis: *An Economic and Social Survey of 150 Farms in Yenshan County, Chihli Province, China.*

Domenic Victor De Pasquale, B.S.: Sewage Treatment, Entomology. Thesis: *A Study of Ithaca Septic Tank and Reconstruction into Imhoff Tanks.*

Myron Gustin Fincher, D.V.M.: Clinical Medicine, Pathology and Bacteriology. Thesis: *Studies of Genital Disease in a Herd of Dairy Cattle.*

Frank Hare, D.V.M.: Veterinary Pathology, Veterinary Physiology. Thesis: *A Study of the Clinical Pathology of the Blood in Canine Distemper.*

John M. Hendrickson, D.V.M.: Veterinary Pathology and Bacteriology, Poultry Husbandry. Thesis: *The Differentiation of Bact. Pullorum "Rettger" and Bact. Sanguinarium "Moore."*

Emilio Infante y Tiongco, B.A., B.S.: Industrial Chemistry, Agricultural Chemistry. Thesis: *The Manufacture of Alcohol from Sugar Cane Molasses.*

Georges Abdullah Knaysi, B.S.: Bacteriology, Organic Chemistry. Thesis: *Some Chemical Factors which Influence the Body of Artificial Buttermilk.*

Arlie Estus McGuire, B.S.A.: Rural Education, Rural Social Organization. Thesis: *Educational Status and Vocational Intentions of Farm Boys.*

John Rustin Alfred McMillan, B.S.Agr.: Plant Breeding, Plant Pathology. Thesis: *A Study of the Inheritance of Glume-length and other Characters in a Cross between Varieties of Triticum Dioccum and Triticum Polonicum.*

William Darrow McMillan, B.S.: Animal Husbandry, Farm Management. Thesis: *Cereal Grains, Their By-Products and Other Livestock Feeds.*

Rita Morales, B.A.: Sanitary Chemistry, Bacteriology. Thesis: *The Detection of Methanol in Alcoholic Beverages.*

Milton Goodrich Nelson, B.S.: Rural Education, Rural Social Organization. Thesis: *A Suggested Method for the Study of the Activities of District Superintendents of Schools in New York State.*

Roy Franklyn Penman, B.S. in E.E.: Applied Electricity, Mathematics. Thesis: *Theory and Application of Three Circuit Transformers.*

David Henry Pierce, B.S.: Education, Economics. Thesis: *The Educational Treatment of Borderland Cases of Mental Deficiency.*

Bhagwant Govind Potdar, B.S.: Industrial Chemistry, Industrial Organization. Thesis: *Solubility Relationships in the System Sodium Chloride, Sodium Sulphate, Sodium Nitrate and Water.*

John George Seibel, B.S.: Farm Management, Animal Husbandry. Thesis: *Seasonal Trends in the Price of Important Mill Feeds.*

Mary Alice Slee, B.A.: Rural Education, Rural Social Organization. Thesis: *Some Aspects of the Training of Teachers for the One-Room Schools.*

Olive Barton Bremner Snow, B.A.: Experimental Physics, Physical Chemistry. Thesis: *The Change in the Resistance of Graphite with Pressure.*

Rafael Andres Toro, B.S. in Agr.: Mycology, Plant Pathology. Thesis: *New or Noteworthy Porto Rican Pyrenomycetes.*

Wesley Gabriel Vannoy B.S.: Physical Chemistry, Optical Chemistry. Thesis: *Peptization of Hydrous Oxides in Concentrated Solutions of Certain Salts.*

Shou Chin Wang, C.E.: Physics, Mathematics. Thesis: *Law of Forces and Torques on Magnetic Matter.*

Sterling Waterman, B.S.A.: Soil Technology, Physical Chemistry. Thesis: *The Carbon Nitrogen Ratio in Soils.*

Francis Henry Wilson, B.S.: Entomology, Education. Thesis: *Preliminary Study of the Mallophaga of New York State.*

Irma Celia Wohlwend, A.B.: Animal Husbandry, Farm Management. Thesis: *The Vitamin Content of Menhaden Fish Meal and Menhaden Oil.*

Paul Rexford Young, B.S.: Rural Education, Rural Organization. Thesis: *An Analysis of the Enrollment in Junior Extension Work in New York State.*

MASTERS OF SCIENCE IN AGRICULTURE

Conferred September 27, 1924

Robert Bruce Dunlap, B.S.: Farm Management, Agricultural Economics. Thesis: *The Agriculture of Blair County, Pennsylvania.*

Raymond William Gregory, B.S.A.: Rural Education, Agricultural Economics. Thesis: *A Study of Some of the Factors that Need to be Taken into Consideration in the Organization of a Part-time Program in Agriculture in Indiana.*

Shukri Hussein Kassabzade, B.S. in Agr.: Agronomy, Farm Management. Thesis: *A Study of the Effects of Climate upon the Chemical Composition of Soils.*

Alfred William Lohman, B.S.Agr.: Poultry Husbandry, Rural Economics. Thesis: *Weight of Egg per Hen as Affecting Market Value.*

Conferred February 4, 1925

William Mason Phipps, B.S. in Agr.: Agronomy, Geology. Thesis: *The Nature of Organic Matter in Calcareous and Non-Calcareous Soils.*

Byron Thomas Smith, B.S.A.: Farm Management, Agricultural Economics. Thesis: *The Business Organization of Seventy Farms in Pulaski County, Arkansas.*

Conferred June 15, 1925

Lawrence Ward Corbett, B.S.: Vegetable Gardening, Physical Chemistry. Thesis: *Changes in Celery During Storage.*

Williard Holden Darst, B.S.: Farm Crops, Botany. Thesis: *Some Physiological Factors to be Considered in the Preparation of Potatoes for Seed.*

James Putnam George, B.S.: Farm Management, Rural Education. Thesis: *An Economic Study of the Agriculture of Madison County, New York.*

Alexander Gordon, B.Ag., B.S.A.: Drainage, Sanitation. Thesis: *Land Drainage with Special Reference to Philippine Conditions.*

Dwarka Nath Misra, B.S.: Dairy Industry, Animal Husbandry. Thesis: *Some Studies in Sweetened Condensed Milk.*

Dodla Muddu Krishna Reddy, B.S.: Animal Husbandry, Poultry Husbandry. Thesis: *The Ongole Cattle, their Origin, Breeding and Development, with Some Special Reference to their Introduction into the Southern States of America.*

Myron Arthur Rice, B.S.: Pomology, Botany. Thesis: *Factors Influencing the Setting of Grapes.*

Charles Ketchum Tucker, B.S.: Dairy Industry, Economics. Thesis: *Commercial Dairy Process Reports.*

MASTERS IN FORESTRY

Conferred February 4, 1925

Philip Carman Wakeley, B.S.: Forest Management, Silviculture. Thesis: *Sustained Yield Management of New York State Woodlots.*

Conferred June 15, 1925

Francis Ezra Cobb, B.S.: Silviculture, Meteorology. Thesis: *A Study of Afforestation in the Great Plains Region from its Early Settlement to the Present Time.*

MASTER OF ARCHITECTURE

Conferred June 15, 1925

Miriam Hilliard Flick, B.Arch.: Architectural Design, History of Architecture. Thesis: *A Sanctuary.*

MASTER IN LANDSCAPE ARCHITECTURE

Conferred February 4, 1925

Marjorie Helen Probasco, B.L.A.: Landscape Design, Fine Arts. Thesis: *Plans and Details for the Proposed Development of "Ekalo," a Residential Property.*

MASTERS OF CIVIL ENGINEERING

Conferred February 4, 1925

Leung Shi Chan, C.E.: Municipal Engineering, Railroad Engineering. Thesis: *An Investigation of the Ithaca Water Supply with some Remedies for its Shortage.*

Kuan San Hsu, B.S.C.E.: Railway and Highway Engineering, Industrial Engineering. Thesis: *Analytical Studies of Highway Traffic and Recent Developments in Pavement Design.*

Dickson Jenyu Hu, B.S.C.E.: Railroad Engineering, Highway Engineering. Thesis: *A Study of Railroad Freight Yards and Terminals.*

Frank Richard Theroux, C.E.: Municipal Engineering, Structural Engineering. Thesis: *The Disposal of the Sewage of Ithaca, N. Y.*

Conferred June 15, 1925

Augustus Harrison Benning, B.S.C.E.: Structural Engineering, Highway Engineering. Thesis: *Graphic Aids to Concrete Design.*

Han Ying Chang, B.S. in C.E.: Railway Engineering, Hydraulic Engineering. Thesis: *A Comparative Study of the Design of Culverts and Small Bridges.*

Ekay Konloh Koo, B.S.: Sanitary Engineering, Railroad Engineering. Thesis: *A Study of Sewage Treatment of Tanks.*

Kit Tsoi Lai, B.S.C.E.: Railroad Engineering, Structural Engineering. Thesis: *A Study of Stress in Railroad Tracks.*

Ching Shi Wang, B.S.C.E.: Railroad Engineering. Structural Engineering. Thesis: *A Study of Railroad Terminals and Yards.*

MASTERS OF MECHANICAL ENGINEERING

Conferred June 15, 1925

Pun Chang Cheng, B.S. in M.E.: Heat-power Engineering, Industrial Engineering. Thesis: *A Study of Flue-Gas Air Preheaters.*

Pun Han Cheng, B.S. in M.E.: Heat-power Engineering, Industrial Engineering. Thesis: *Design of a Steam Power Plant for Hangchow, China.*

Ernest Mercer Fernald, M.E.: Experimental Engineering, Machine Construction. Thesis: *Measurement of the Flow of Air Apparatus for Determination of Propulsive Characteristics of Model Ships.*

Dewar Illiad Niu, B.S. in M.E.: Heat-Power Engineering, Industrial Engineering. Thesis: *Design of a Diesel Power Plant for Huchow, China.*

Thomas Ka Shen, B.S. in M.E.: Heat-Power Engineering, Industrial Engineering. Thesis: *Design of a Steam Power Plant for a District in China.*

Wen You Ying, B.S.M.E.: Heat-Power Engineering, Industrial Engineering. Thesis: *A Central Power Station and Low Pressure Steam Industry.*

Polixenes Leo Yuan, B.S. in M.E.: Heat-Power Engineering, Industrial Engineering. Thesis: *Design of a Steam Power Plant for Soochow, China.*

MASTERS OF ELECTRICAL ENGINEERING

Conferred February 4, 1925

Waken Chang, B.S. in E.E.: Electrical Engineering, Heat-Power Engineering. Thesis: *Mechanical Wave Model for the Study of Transient Phenomena on Electric Lines.*

Loo-Sing Wang, B.S. in E.E.: Electrical Engineering, Heat-Power Engineering. Thesis: *On the Power Limit of the Long-Distance Transmission System.*

Conferred June 15, 1925

James Stewart Arbuckle, B.S. in E.E.: Electrical Engineering, Hydraulic Power Plants. Thesis: *Preliminary Design of a Hydro-Electric Power Plant at Pine Falls, Manitoba.*

John Hall Skeen, B.S.C.E.: Electrical Engineering, Finance. Thesis: *Economic Aspects of Power System Layout.*

DOCTORS OF PHILOSOPHY

Conferred September 27, 1924

Max Flavel Abell, B.S.: Farm Management, Farm Crops, Botany. Thesis: *Types of Farming in Southern New England and some Factors affecting them.*

Howard Bernhardt Adelmann, A.B., A.M.: Histology and Embryology, Systematic Vertebrate Zoology, Human Physiology. Thesis: *The Development of the Neural Folds and Cranial Ganglia of the Rat.*

Raymond William Bell, B.S., M.S. in Agri.: Dairy Industry, Organic Chemistry, Physical Chemistry. Thesis: *The Effect of Heat on the Solubility of the Calcium and Phosphorus Compounds of Milk.*

Paul Chen Fugh, B.S.F.: Rural Education, Rural Social Organization, Education. Thesis: *Reconstruction of the Chinese Rural Elementary School Curriculum to Meet Rural Needs in China.*

Ralph Gordon, A.B., A.M.: English Language and Literature, Old English, Philosophy. Thesis: *Shelley's Alastor: A Study in the Technique of Blank Verse.*

Francis Evaul Hance, B.Chem.: Inorganic Chemistry, Physical Chemistry, Industrial Chemistry. Thesis: *Metallic Germanium.*

Andrew Joseph Hemmer, B.Chem.: Organic Chemistry, Physical Chemistry, Industrial Chemistry. Thesis: *Fluorescein and some of its Derivatives.*

Paul McCorkle, B.A., M.S.: Experimental Physics, Theoretical Physics, Mathematics. Thesis: *Magnetostriction and Magnetoelectric Effects in Iron, Nickel, and Cobalt.*

Elizabeth Fallin Möller, A.B., A.M.: Psychology, Education, French. Thesis: *The "Glassy Sensation."*

Elias H. Panganiban, B.Agr., B.S.Agr., M.S.Agr.: Soil Technology, Agricultural Chemistry, Analytical Chemistry. Thesis: *Temperature as a Factor in Nitrogen Changes in the Soil.*

Myers Peter Rasmussen, B.S.: Rural Economics, Farm Management, Economics. Thesis: *An Economic Study of the Marketing of New York State Potatoes.*

Harry Albert Ross, B.S., M.S.: Agricultural Economics, Economics, Farm Management. Thesis: *Milk Marketing in the Chicago Dairy District.*

Mary Susan Steele, A.B., A.M.: Elizabethan English, History of Philosophy, Nineteenth Century Literature. Thesis: *Plays and Masques at Court,* 1558–1642.

Mabel Virginia Wilson, B.A., M.A.: Ethics, Logic and Metaphysics, Psychology. Thesis: *The Social-Political Philosophy of Auguste Comte.*

Eunice Work, B.A., A.M.: Latin, Greek, Archaeology. Thesis: *Cicero's* De Oratore *Lib. I: A Collation of Codex Cornellianus* 28, *with Vaticanus* 2901, *and Vaticanus Palatinus* 1470.

Conferred February 4, 1925

Sherman Chancey Bishop, B.S.: Entomology, Systematic Zoology, Biology. Thesis: *A Revision of the Pisauridae of North America.*

Ralph Thomas Kline Cornwell, B. Chem: Organic Chemistry, Industrial Organization, Agricultural Chemistry. Thesis: *Thymolsulfonephthalein, the Intermediate Acid,* 4^1 *-Hydroxy-*3^1 *-Isopropyl-*6^1 *-Methyl-Benzoyl-2-Benzene Sulfonic Acid and Some of their Derivatives.*

Julian Dana Corrington, A.B.: Comparative Vertebrate Morphology, Histology and Embryology, Systematic Vertebrate Zoology. Thesis: *On the Morphologic History of the Anterior Arteries of Sharks.*

Alfred Edwards Emerson, B.S., A.M.: Biology, Systematic Entomology, Insect Morphology. Thesis: *The Termites of Kartabo, British Guiana.*

Stuart Ward Frost, B.S.: Economic Entomology, Systematic Entomology, Zoology. Thesis: *A Study of the Leaf Mining Diptera of North America.*

Grace Hall Griswold, B.S.: Economic Entomology, Landscape Art, Insect Morphology. Thesis: *A Study of the Oyster Shell Scale.*

Ernest Herman Hespelt, A.B., A.M.: German Literature, German Philology, Spanish Literature. Thesis: *Fernan Caballero, A Study of her Life and Letters.*

William Clifford Martin, B.A., M.A.: Literary Criticism, Mediæval History, Greek. Thesis: *Edmund Spenser's "A View of the Present State of Ireland." An Annotated Edition.*

Ernest William Nelson, A.B., A.M.: Mediæval History, Modern European History, Philosophy. Thesis: *Heresy and the Secular Arm.*

Charles Victor Noback, D.V.M.: Pathology, Biochemistry, Physiology. Thesis: *A Study of Nephritis in Domestic Animals.*

Charlotte Helen Pekary, A.B., A.M.: German Literature, German Philology, French. Thesis: *The Feminist Movement in Germany as Reflected in the Contemporary Novels of German Women.*

David Harris Willson, B.S.: English History, Modern European History, Mediaeval History. Thesis: *The Relation of the Privy Council and Parliament from the Accession of Elizabeth to the End of the Session of* 1629.

CONFERRED JUNE 15, 1925

Benjamin William Barkas, B.S., A.M.: Rural Economy, Modern European History, Economic Theory. Thesis: *The French Revolution and Agrarian Rationalism of the Nineteenth Century.*

George Henry Brandes, B.Chem.: Physical Chemistry, Analytical Chemistry, Economic Geology. Thesis: *Studies on Indicators, Neutralization and Hydrogen-Ion Concentration.*

Miles Hugo Cubbon, B.S.: Agronomy, Physical Chemistry, Pomology. Thesis: *Calcium Sulphate as a Soil Amendment.*

Lauchlin MacLaurin Currie, A.B., M.A.: Physical Chemistry, Industrial Chemistry, Analytical Chemistry. Thesis: *Antimony Sulphides.*

Ruby Davis, A.B., A.M.: English Literary Criticism, English Language, German. Thesis: *Bede De Arte Metrica with an Introduction, a Translation and Notes.*

Joseph Alma Dye, B.A.: Human Physiology, Biochemistry, Bacteriology. Thesis: *Cell Changes in the Central Nervous System under Various Natural and Experimental Conditions.*

Paul Henry Fall, A.B., M.A.: Physical Chemistry, Sanitary Chemistry, Optical Chemistry. Thesis: *The Detergent Action of Soaps.*

Karl Hermann Fernow, B.S.: Plant Pathology, Botany, Physical Chemistry. Thesis: *Interspecific Transmission of Mosaic Diseases of Plants.*

John Sutliff Fonda, B.Chem.: Organic Chemistry, Physical Chemistry, Physics. Thesis: *Factors Determining the Whiteness and Opacity of White Paint.*

Nathaniel Fuchs, B.Chem.: Organic Chemistry, Physical Chemistry, Physics. Thesis: *Pyrogallolsulfonephthalein, 2, 3, 4–Trihydroxy-benzoyl–Benzene–O–Sulfonic Acid, the Intermediate Acid, and Some of their Derivatives.*

Harry S. Gabriel, B.S.: Agricultural Economics, Rural Education, Economics. Thesis: *Index Numbers of Freight Rates.*

Viola Arvin Graham, A.B., A.M., M.S.: Biochemistry, Foods Chemistry, Organic Chemistry. Thesis: *Experimental Proof of the Protein Nature of Urease.*

Abel Charles Gurchot, B.S.: Physical Chemistry, Physiology, Optical Chemistry. Thesis: *Permeability of Membranes.*

Francis Harper, A.B.: Biology, Ornithology, Limnology. Thesis: A *Faunal Reconnaissance in the Athabaska and Great Slave Lakes Region.*

Marvin Theodore Herrick, A.B., A.M.: English Literature, Mediaeval History, English Language. Thesis: *The History of Aristotle's Poetics in England.*

Freeman Smith Howlett, B.S.: Pomology, Plant Physiology, Physical Chemistry. Thesis: *The Nitrogen and Carbohydrate Composition of the Developing Flowers and Young Fruits of the Apple.*

Frederick LaFayette Jones, A.B., M.A.: English Literature, Victorian Literture, Philosophy. Thesis: *Henry Chettle: A Study of His Life and Works.*

Alfred Brooker Klugh, B.A., M.A.: Limnology, Insect Ecology, Ornithology. Thesis: *The Ecology and Culture of Entomostraca.*

Gustaf Adolph Lundquist, A.B., M.A.: Rural Social Organization, Marketing, Rural Education. Thesis: *The Social Significance of Educational Inequalities in Four Rural Townships in Minnesota.*

Charles Merrick Nevin, B.S., M.S.: Economic Geology, Petrography, Paleontology. Thesis: *Some Physical Properties of Molding Sands.*

Herbert John Pack, B.S., M.S.: Economic Entomology, Limnology, Herpetology. Thesis: *A Biological Study of Certain Ladybird Beetles (Coccinellidae).*

Katherine Van Winkle Palmer, B.S.: Paleontology, Stratigraphy, Systematic Zoology. Thesis: *The Veneridae of Eastern America; Cenozoic and Recent.*

Charles Kelly Powell, B.S., M.S.: Poultry Husbandry, Farm Management, Bacteriology. Thesis: *Productive Factors Influencing the Interior Quality of Eggs.*

Walter Van Price, B.S., M.S.: Dairy Industry, Bacteriology, Organic Chemistry. Thesis: *Experiments in the Manufacture of Cheddar Cheese from Milk Pasteurized by the Holder Method.*

John Paul Pritchard, A.B.: Greek, Latin, English. Thesis: *The Influence of the Fathers upon Milton with Especial Reference to Augustine.*

Edgar Heisler Riley, A.B.: English Literature, Old English, Medieval History. Thesis: *The Virgilian Element in the Works of Milton.*

Charles Kerr Sibley, B.S.: Limnology, Systematic Vertebrate Zoology, Aquiculture. Thesis: *An Ecological Study of Certain Invertebrates, with Special Reference to the Trichoptera, Found Within the McLean Wild Life Preserve.*

Josephine Overton Souders, A.B.: Physical Chemistry, Physics, Organic Chemistry. Thesis: *Some Studies on the Corrosion of Metals.*

Margaret Loomis Stecker, A.B.: Economics, Labor, Social Science and Statistics. Thesis: *An Unsuccessful Experiment in Collective Bargaining.*

Paul Warttman, B.A., M.S.: Inorganic Chemistry, Industrial Chemistry, Physical Chemistry. Thesis: *The Reaction Between Sulphur Trioxide and Hydrogen Cyanide.*

Donald Stuart Welch, B.S.: Mycology, Plant Pathology, Botany. Thesis: *A Monographic Study of the Genus Cucurbitaria in North America.*

Luther Shirley West, B.S.: Economic Entomology, Limnology, Histology and Embryology. Thesis: *The Phasiidae and Tachinidae of New York and Adjacent States.*

George Norton Wolcott, B.S. in Agr.: Insect Ecology, Economic Entomology, Insect Morphology. Thesis: *An Animal Census of Pasture and Meadow in Northern New York.*

MEMBERS OF THE STAFF OFFERING GRADUATE WORK

INDEX

The announcements of the several colleges of the University describe opportunities and facilities for advanced work with more detail than this pamphlet does. Reference to those Announcements is indicated below by means of the symbols in parenthesis, as follows: College of Arts and Sciences (A & S), College of Agriculture (Ag), Veterinary College (Vet), Medical College in Ithaca (Med), Medical College in New York City (NYMed), College of Architecture (Arch), College of Engineering (E), College of Home Economics (HE), Experiment Station at Geneva (G). See the last page of the cover of this pamphlet.